Vegetation Management Plan

Wollongbar Reserves

Report prepared for Ballina Shire Council

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DOCUMENT CONTROL

Revision	Date	Description	Prepared	Reviewed
DRAFT	19 October 2022	Draft VMP Wollongbar Reserves	S.Pimm / A. McKinley	R.James
DRAFT 2	19 December 2022	Vegetation Management Plan Wollongbar Reserves	S.Pimm	R.James
FINAL DRAFT	23 May 2023	Vegetation Management Plan Wollongbar Reserves	S.Pimm	RJames
FINAL DRAFT V2	20 March 2024	Vegetation Management Plan Wollongbar Reserves	R.James & V.Lopez	RJames
FINAL	27 March 2024	Vegetation Management Plan Wollongbar Reserves	R. James and V. Lopez	R. James

DISCLAIMER

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EXECUTIVE SUMMARY

Ballina Shire Council (BSC) contracted Bushland Restoration Services to prepare a Vegetation Management Plan (VMP) for vegetated public reserves at Wollongbar (**Figure 1**). The overall site is approximately bounded by the Bruxner Highway in the southeast, Sneaths Road in the west and north and Pearces Creek Road in the east (**Figure 2**).

This VMP discusses a variety of previous restoration and offset plans which relate to distinct parts of the overall site. Appropriate actions and recommendations from these previous plans have been incorporated into this current plan. This VMP is intended to be used to guide the restoration of the various bushland reserves, proposed to be implemented using a combination of Landcare volunteers, industry professionals, Council staff and local residents.

The overall site is of high environmental value and includes:

- An Endangered Ecological Community (Lowland Rainforest) listed under the NSW *Biodiversity Conservation Act 2016* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999,* representing part of the former 'Big Scrub' Rainforest.
- Threatened flora species listed under both Acts listed above.
- Mapped 'High Biodiversity Value' on the Biodiversity Values Map (authorised by the *Biodiversity Conservation Act 2016)* along Willowbank Creek (Site 13).
- A wide variety of contiguous and fragmented vegetation and habitat types, ranging from lowland rainforest and riparian zones to managed parkland.

This plan addresses these values and provides details as to restoration actions to be carried out to improve habitat for flora and fauna. It will also add to conservation and restoration information available to local residents.

The subject site is divided into fifteen reserves owned and managed by Ballina Shire Council (primarily as Community Land), with a total area of 20.8ha. The reserves range in size from 169m^2 in Elvery Road Reserve to the 5.2ha Wollongbar Rainforest Reserve.

This plan divides the overall site into management zones and provides detailed vegetation restoration actions and recommendations, including identifying and providing control measures for the invasive weed species throughout the subject site. Subtropical Rainforest is the most prevalent and important vegetation community within the VMP area and rehabilitation planting species lists are provided for revegetation of suitable cleared areas.

1. INTRODUCTION

This Vegetation Management Plan (VMP) has been prepared for the management of vegetated public Council-owned reserves at Wollongbar. The overall site is approximately bounded by the Bruxner Highway in the southeast, Sneaths Road in the west and north and Pearces Creek Road in the east.

The area subject to this Vegetation Management Plan is divided into fifteen reserves with a total area of 20.8 hectares. The reserves range in size from 169m^2 in Elvery Road reserve to the 5.2ha Wollongbar Rainforest Reserve. A number of the sites are adjacent sports fields or within drainage reserves. This VMP is an upgrade of several existing vegetation management and rehabilitation plans into the one single plan, with incorporation of additional new sites.

1.1 Location

The subject sites are in the town of Wollongbar within Ballina Shire, northwest of Ballina and Alstonville and east of Lismore.

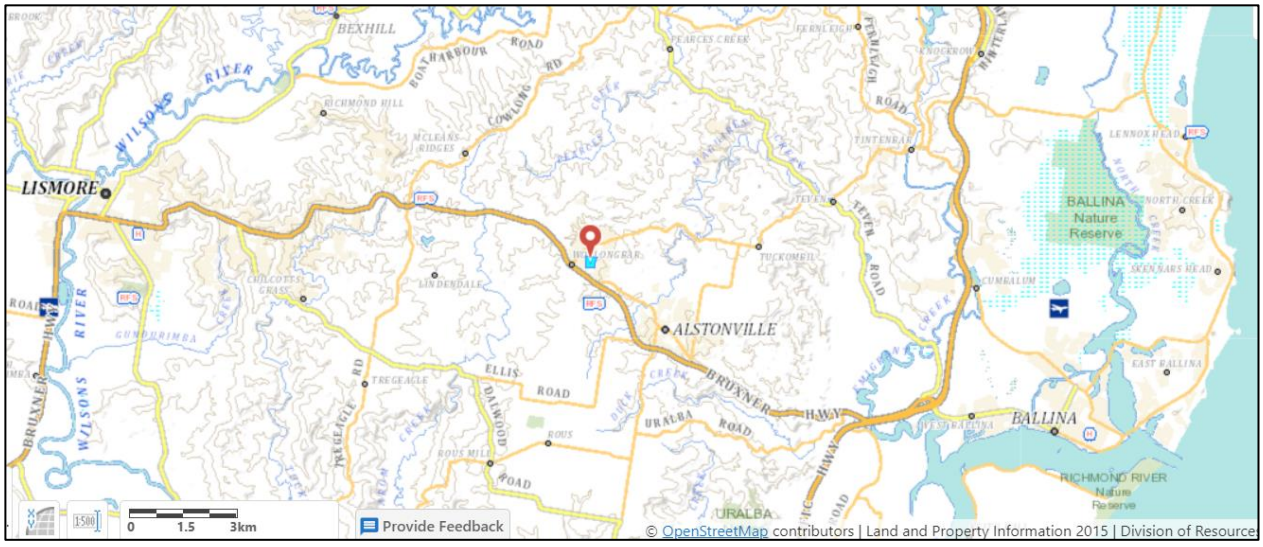

Figure 1: The general location of the reserves is shown by the red arrow above.

1.2 Aims and Objectives

The aims of this Vegetation Management Plan are to improve the condition of retained vegetation and fauna habitat, and to inform and educate local residents as to the reserve values.

The primary objectives as detailed in the brief are:

- *Conduct a site assessment and an ecological survey for vegetation community boundaries, species and lists/ maps.*
- *Determine VMP zonings and restoration actions to guide both contractors and volunteers.*
- *Determine aims and objectives to achieve the established target condition and restoration goals.*
- *Identify all suitable planting areas including size of area, species and planting list.*
- *Address fauna habitat improvement considerations for ongoing restoration efforts.*
- *Address all weed species identification, issues and control measures.*
- *Address vegetation management and related issues.*
- *Recommend suitable species for revegetation.*
- *Address all current and relevant legislation.*
- *Address Aboriginal cultural heritage management.*
- *Address infrastructure management, including upgrades and visitor facilities where relevant.*

- *Address track management and pedestrian infrastructure.*
- *Address monitoring and record keeping.*
- *Consider all existing plans and relevant documents.*
- *Consider all public events and other anthropological uses of the sites.*
- *Form the basis for Council planning approval prior to implementation.*

The VMP will be used to guide the restoration of the various bushland reserves with a combination of Landcare volunteers, industry professionals, Council staff and residents implementing the plan. It will also consider public reserve use and infrastructure provisions where appropriate.

Plate 1: Remnant and planted vegetation occur amongst residential development.

2. PROJECT AREA DESCRIPTION

2.1 Property Details

The fifteen reserves which make up the subject site have each been given a number and name for easy identification (see **Table 1** and **Figure 2** below). All sites are on Ballina Shire Council-owned land, classified as Community Land, apart from the drainage reserves (Operational Land) and linear areas along road reserves.

Table 1 - Site property details

Map Number	Site name	Area (ha)	Real Property Description	BSC 2012 Local Environment Plan Land Zoning	BSC 1987 Local Environment Plan Land Zoning
1	Site 1: Bruxner Highway Buffer	0.5878	Part Lot 18 DP 1059476 Lot 8 DP 814058 Lot 9 DP 814058	1a, 1c: RE1 Public Recreation. 1b: DM Deferred Matter	Unzoned (UZ)
2	Site 2: Lismore Road/ Kays Lane	1.0471	Part Lot 18 DP 1059476	DM Deferred Matter	7 (i) Environmental Protection – Urban Buffer
3	Site 3: County Court Public Reserve	0.374	Lot 84 DP 810223	RE1 Public Recreation	Non applicable
4	Site 4: Wollongbar Rainforest Reserve	5.1598	Lot 105 DP 807798 Lot 127 DP 814523	RE1 Public Recreation	Non applicable
5	Site 5: Wollongbar Drainage Reserve	1.1241	Part Lot 65 DP 786758	RE1 Public Recreation	Non applicable
6	Site 6: Rubiton Park	0.2426	Part Lot 65 DP 786758 Part Lot 267 DP 1209571	RE1 Public Recreation	Non applicable
7	Site 7: Cerreto Circuit Reserve	0.0631	Lot 113 DP 814523	RE1 Public Recreation	Non applicable
8	Site 8: Lyle Park	1.4984	Part Lot 106 DP 807798	RE1 Public Recreation	Non applicable
9	Site 9: Wollongbar Sports Fields	5.3446	Part Lot 2 DP 1168781	DM Deferred Matter	7(i) Environmental Protection – Urban Buffer
10	Site 10: Elvery Lane Road Reserve	0.1692	Road Reserve Elvery Lane	DM Deferred Matter	7(i) Environmental Protection – Urban Buffer
11	Site 11: Western Reserve Wollongbar Residential Estate (Kurrabri)	3.1227	Lot 94 DP 1262196 Lot 183 DP 1232965 Lot 101 DP 1212282	DM Deferred Matter, R3 Medium Density Residential, RE1 Public Recreation	7(d) Environmental Protection – Scenic/Escarpment.
12	Site 12: North Reserve Wollongbar Residential Estate (Mt Moriah)	1.4045	Lot 182 DP 1232965 Part Lot 21 DP 1203362	R2 Low Density Residential, R3 Medium Density Residential, DM Deferred Matter	7(d) Environmental Protection – Scenic/Escarpment.
13	Site 13: Eastern Reserve Wollongbar Residential Estate	0.3649	DP 1203362	R2 Low Density Residential, DM Deferred Matter,	7(d) Environmental Protection – Scenic/Escarpment.
14	Site 14: South-eastern Reserve Wollongbar Residential Estate	0.1306	DP 1203362	DM Deferred Matter	7(d) Environmental Protection – Scenic/Escarpment.
15	Site 15: Wollongbar District Park	0.1548	Part Lot 45 DP 1242246 Part Lot 130 DP 1276352	15a: R2 Low Density Residential, 15b: RE1 Public Recreation	Non applicable
	TOTAL AREA	**20.79ha**			

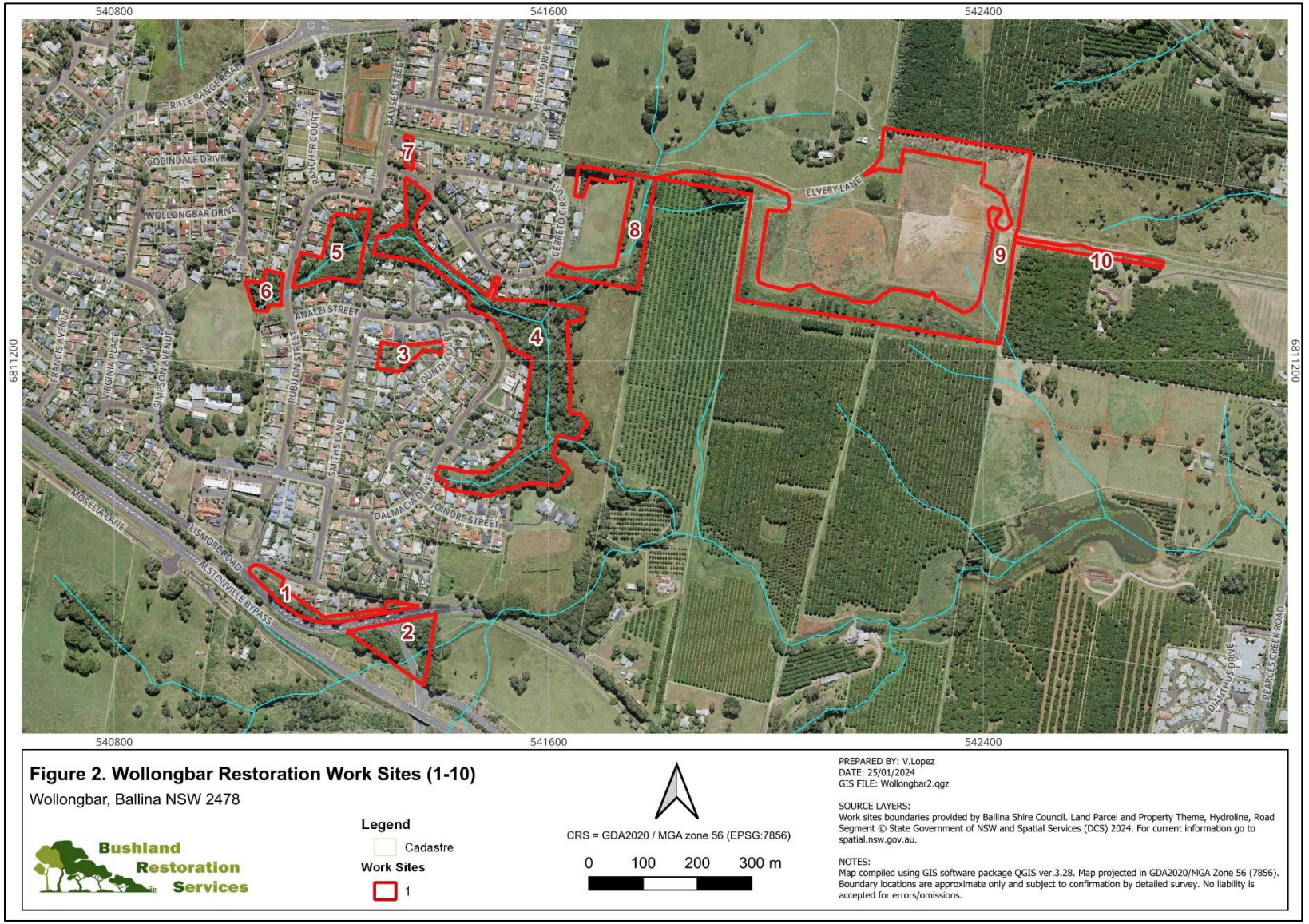

Figure 2. Restoration Work Sites 1 to 10.

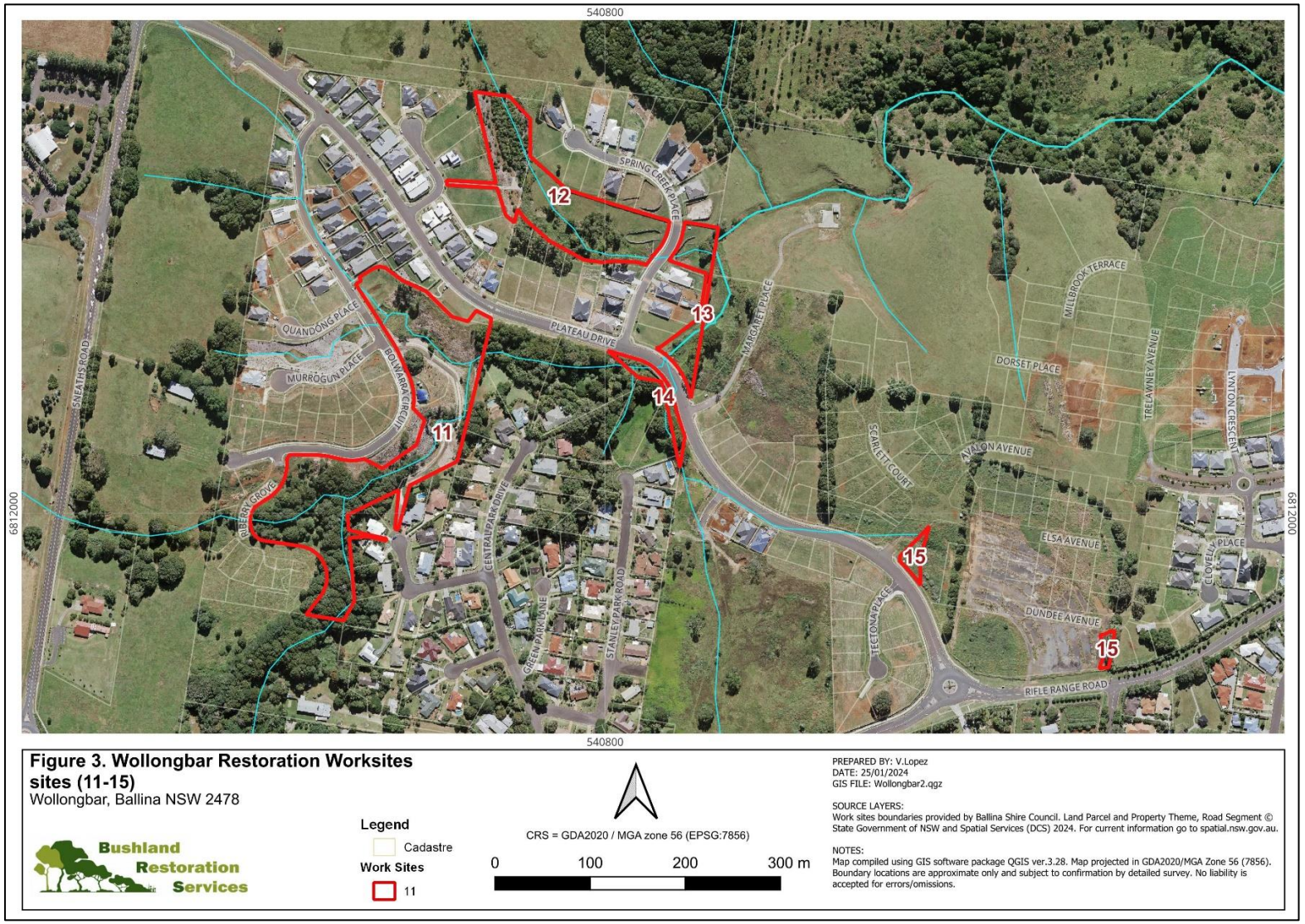

Figure 3. Restoration Work Sites 11 to 15.

2.2 Land use zoning

All land use classifications for sites 1 – 15 are sourced from the Ballina Shire Council Local Environmental Plan (LEP) 2012, which are shown in **Table 1**. Where the lot is classified as DM 'Deferred Matter', the zoning from the BSC Local Environmental Plan 1987 applies.

Under the BSC LEP 1987, the DM parcels were zoned 7(d) Drainage and 7(l) Environmental Protection (Habitat) at the Wollongbar Sports Fields. This latter area is now being used in part to house victims of the 2022 flood.

2.3 Site Access

Sites are easily accessed by a two-wheel drive vehicle to each of the reserves from the adjacent sealed roads.

2.4 Topography, Geology and Soils

The geology of all sites arises from Lismore Basalts of the Lamington Volcanics, being Tertiary basalt with bole and minor agglomerate, giving rise to fertile red ferrosol soils with a high clay content. Topography of the area consists of low rolling hills within the Alstonville Plateau.

Soils found in all sites are considered Ferrosols under the Australian Soil Classification. Most of the area of sites 1, 2, 3, 6, 9 and 15 occur on the Wollongbar soil landscape of Morand (1996). Soils are mostly deep (>200 cm), well-drained Ferrosols (Gn3.11, Gn4.11, Uf5.22) with shallower (80 -150 cm), stonier Ferrosols (Gn3.11, Gn4.11, Uf5.22) on crests and upper slope boundaries and wet alluvial Ferrosols (Uf5, Uf6) in drainage lines.

All other sites are located on the Bangalow soil landscape with moderately deep to deep (100–>200 cm), well drained Ferrosols and brownish red Ferrosols (Uf5.21, Uf5.22, Gn3.11, Gn4.11), with poorly drained alluvial Ferrosols in drainage lines.

2.5 Vegetation Overview

The work sites show four primary vegetation types:

1. Subtropical Rainforest
2. Established rainforest plantings
3. Planted Rainforest
4. Garden Plantings/ lawn

Detailed vegetation descriptions are contained in **Section 7** and illustrated on **Figure 11.**

Additional planted species and garden beds occur around the boundaries with residential dwellings.

3. RELATED ENVIRONMENTAL LEGISLATION

3.1 Federal Legislation - Environmental Protection and Biodiversity Conservation Act (EPBC) 1999

The Protected Matters Search Tool under the *Environmental Protection & Biodiversity Conservation Act 1999 (EPBC Act)* for an area of 10km x 10km centred on the subject site indicates potential for 4 threatened ecological communities and 56 threatened species.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	56
Listed Migratory Species:	15

One Critically Endangered Ecological Community (CEEC) listed under the EPBC Act occurs on site, being:

- *Lowland Rainforest of Subtropical Australia*. The large Rainforest remnant known as Wollongbar Rainforest Reserve (Site 4) is likely to meet the guidelines for the Commonwealth EPBC Act listing.

EPBC-listed Threatened Flora recorded within the subject site include:

- The Critically Endangered Scrub Turpentine *Rhodamnia rubescens (*Site 4, 11 and 12*).*
- The Critically Endangered Smooth Scrub Turpentine *Rhodamnia maideniana* (Site 4 and 12*).*
- The Endangered Davidson's Plum *Davidsonia jerseyana* (Site 9).
- The Vulnerable species Coolamon *Syzygium moorei (*Site 4*).*
- The Vulnerable species Magenta Lilly Pilly *Syzygium paniculatum (*Site 4*).*
- The Vulnerable species Red Lilly Pilly *Syzygium hodgkinsoniae* (Site 2).
- The Vulnerable species Rough-shelled Bush Nut *Macadamia tetraphylla (*Site 4).

Both of the Critically Endangered species listed above were affected by Myrtle Rust. One other Critically Endangered species Native Guava *Rhodomyrtus psidioides* previously recorded in Sites 11 and 12 was not found within either site, and is assumed to have succumbed to the rust fungus.

Fauna species listed under the EPBC Act previously recorded in the study area are:

- The Koala *Phascolarctos cinereus* (combined populations of Queensland, New South Wales and the Australian Capital Territory) - listed as Endangered. Given that each of the sites investigated for this plan consisted of rainforest species, the Koala is not likely to rely on any of the sites.

3.2 NSW Biodiversity Conservation Act 2016 (BC Act)

A small part of the sites along Willowbank Creek (Sites 13 and 14) is mapped as **High Biodiversity Value** (purple on the map below representing 'biodiverse riparian land') on the Biodiversity Values (BV) Map. Removal of native vegetation in the mapped area would require entry into the NSW Biodiversity Offsets Scheme. No clearing of native vegetation is proposed within the mapped BV area. The site is not within an Area of Outstanding Biodiversity Value.

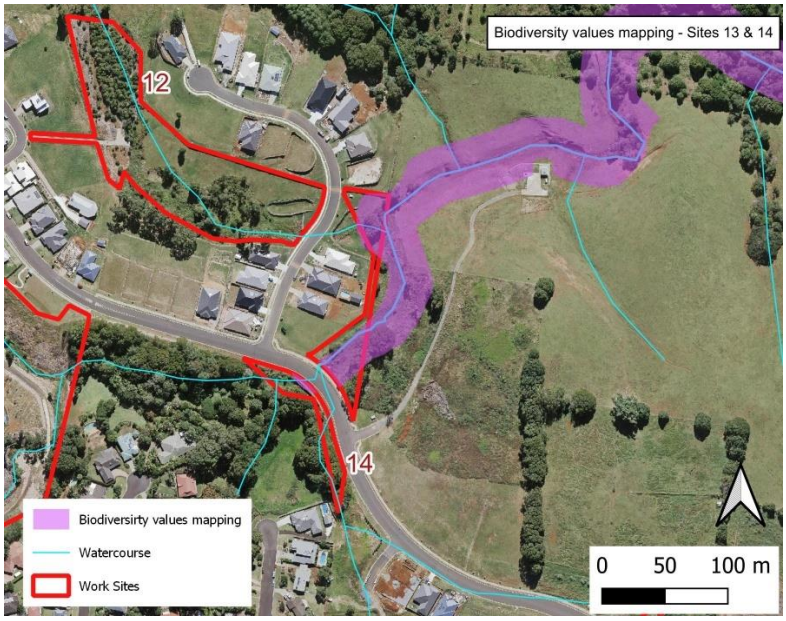

Figure 4: Biodiversity Values map extract. Purple shading indicates 'biodiverse riparian land'.

Endangered Ecological Communities

One Endangered Ecological Community (EEC) listed under the BC Act is present on site:

- *Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions* is listed as an Endangered Ecological Community and occurs at Sites 2, 4, 11 and 12. Any removal of native vegetation would require an Assessment of the Significance of the loss. Bush regeneration works concentrate on removal of exotic species and such work is exempt.

Threatened Flora

Six threatened flora species were recorded during current survey of the project area – Rough-shelled Bush Nut, Davidson's Plum *Davidsonia jerseyana*, Magenta Cherry *Syzygium paniculatum,* Arrowhead Vine *Tinospora tinosporoides,* Scrub Turpentine *Rhodamnia rubescens* and Smooth Scrub Turperntine *Rhodamnia maideniana* - within rainforest communities on the site. One threatened species Fine-leaved Tuckeroo *Lepiderema pulchella* has been planted within the biological buffer to Wollongbar Sports Fields and is outside the known range of the species, which is found north of Brunswick Heads, with most records in NSW from the Tweed Valley.

Threatened Fauna

The VMP project area provides vegetation community types dominated by rainforest that together support a range of habitat types for native fauna, including threatened species. Movement opportunities for fauna through the study area are limited by fragmentation of native vegetation, cleared lands, residential development and roads. Nectivores and frugivores such as Rose-crowned Fruit Dove *Ptilinopus regina* and Superb Fruit Dove *Ptilinopus superbus* and Grey-headed Flying-fox *Pteropus poliocephalus* are likely to use Subtropical Rainforest.

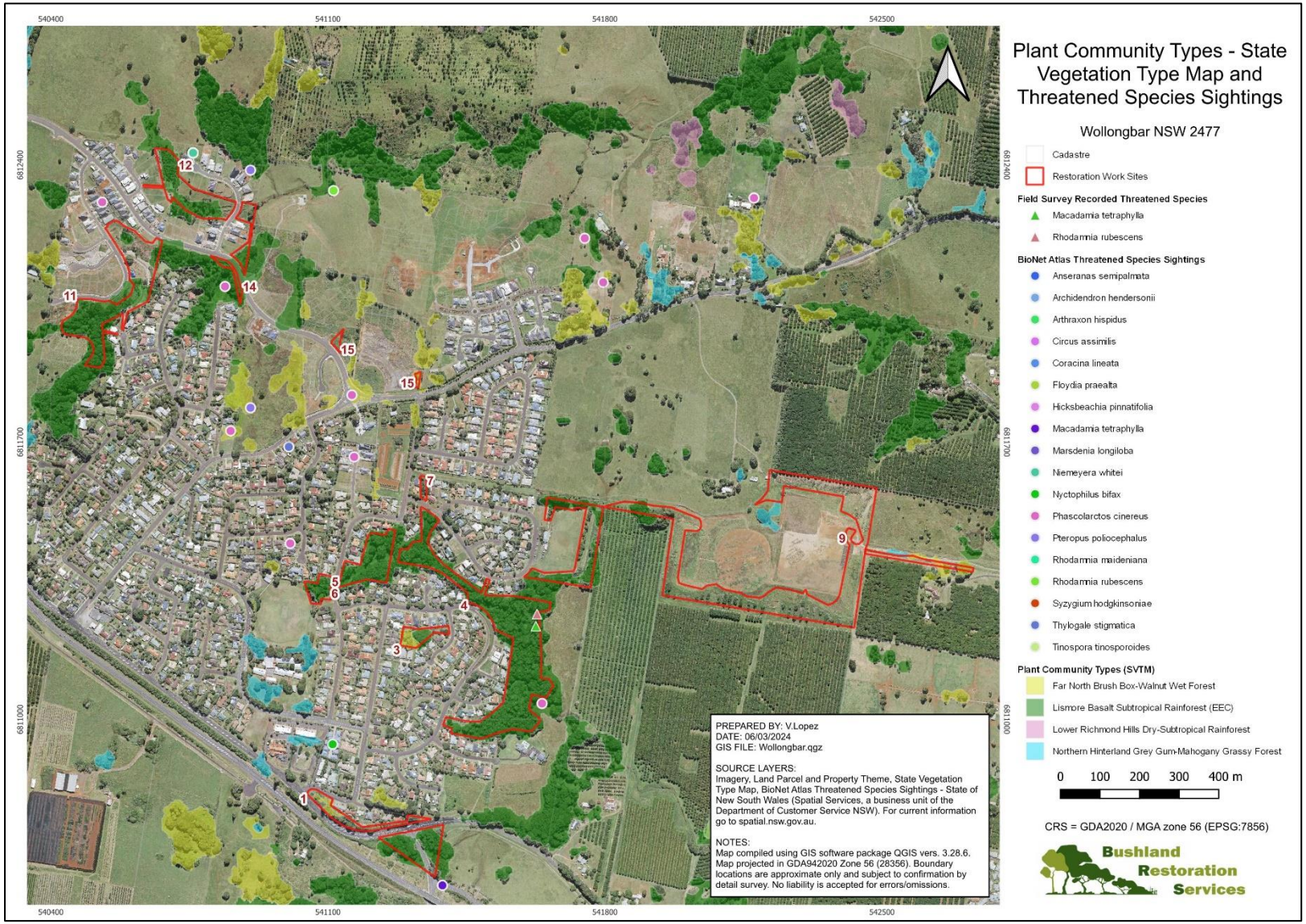

Figure 5: Plant Community Types and Threatened Species Sightings Map.

3.3 State Environmental Planning Policy (Resilience and Hazards) 2021

The site does not include any vegetation mapped as 'Coastal Wetland', 'Littoral Rainforest' or 'proximity areas'.

3.4 State Environmental Planning Policy (Environment and Conservation) 2022

Chapter 4 Koala Habitat Protection 2021 applies to development applications in urban and environmental zones, including Recreation, Residential zones and Environmental Protection zones, which includes 'Deferred Matter' areas not yet defined as an LEP zone. Where the land parcel has an area of at least 1 hectare (including adjoining land within the same ownership) and does not have an approved koala plan of management applying to the land, assessment to determine whether any development is likely to have any impact on koalas or koala habitat is required.

Although scattered BioNet records of Koalas occur in the local Wollongbar area, only Site 5 contained a Preferred Koala Food Tree, being Swamp Mahogany *Eucalyptus robusta* and this had been planted at the site. The reserves generally do not include any trees belonging to the koala use tree species listed in Schedule 3 for the North Coast koala management area and the subject site is not core koala habitat.

3.5 Ballina Local Environmental Plan

The sites are variously zoned as RE1 Public Recreation and Deferred Matter under Ballina LEP 2012, reverting to 7(d) Scenic Escarpment under Ballina LEP 1987. None of the subject sites are currently included in the draft Conservation zones proposed as LEP updates.

3.6 Ballina Development Control Plan 2012 (DCP)

Ballina DCP 2012 maps parts of the subject site as:

- Significant Urban Bushland – to be protected. This is mapped over Sites 4, 5, 11, 12 and 13.
- Natural Areas and Habitat - where any development must demonstrate a net environmental benefit. This is mapped over sites 1, 2, 11, 12, 13 and 14, along with 50m buffers surrounding the native vegetation on these sites. It is also mapped over Site 4 (buffer on the eastern side), Site 8 (buffer surrounding Lyle Park), Site 9 (Natural Area now sports fields with planted vegetation) and 10 (Natural Area now a road reserve).

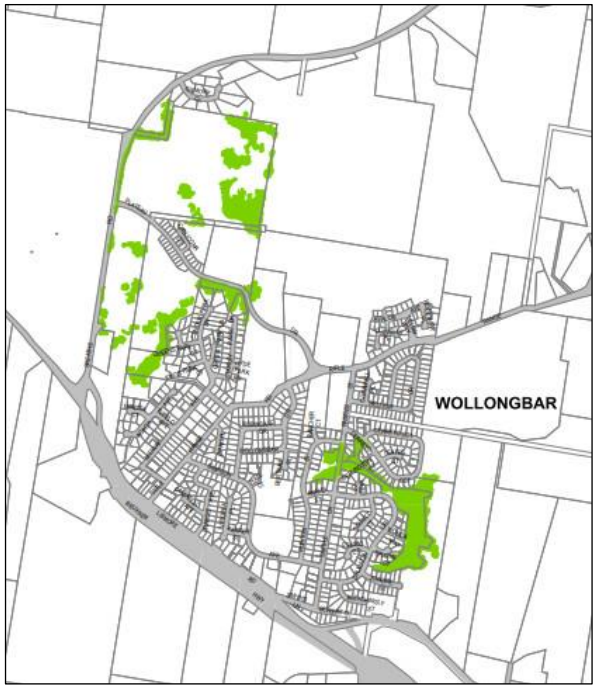

Figure 6: Significant Urban Bushland is mapped as lime green and includes Sites 4, 5, 11, 12 and 13.

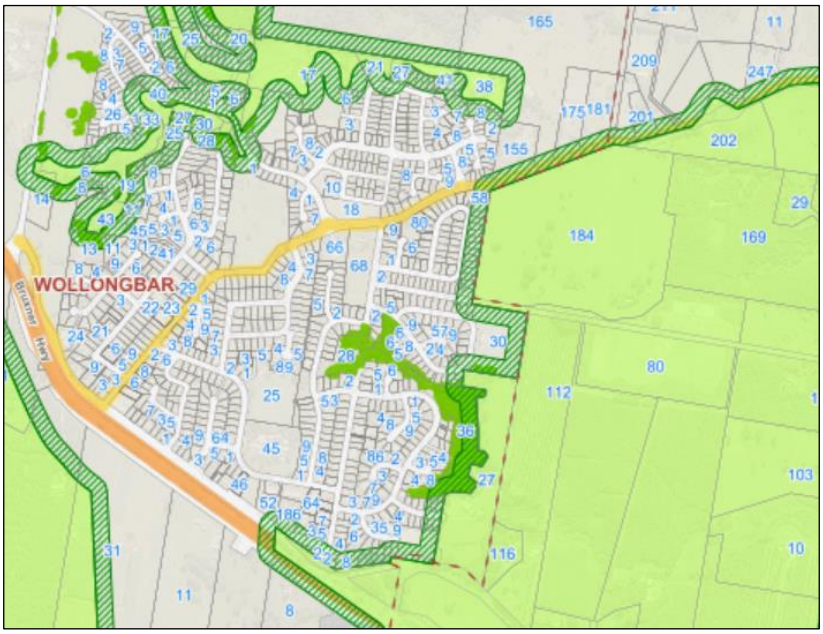

Figure 7: Natural Area and Habitat is mapped as light green, with the 50m buffer shown as green hatching.

3.7 Ballina Koala Plan of Management

The project area is not mapped as any of the following categories under the *Ballina Shire Council Koala Management Strategy 2016* – Important population, Core Koala Habitat or Preferred Koala habitat.

4. ABORIGINAL CULTURAL HERITAGE

An extensive Aboriginal Heritage Information Management System (AHIMS) search was undertaken in October 2022 and returned 4 sites of importance within the local Wollongbar area. They include two archaeological sites containing artifacts and two water holes, the latter including Site 4 Wollongbar rainforest remnant. They can be found in **Appendix 3.**

The area is of significance to local Aboriginal people. Works proposed in this plan will improve the condition of local remnant vegetation, improve habitat value for local native fauna species and preserve the integrity of the area. Refer to Wollongbar Planning and Environmental Study 2019 on Ballina Council's website for more detailed information on Wollongbar aboriginal cultural heritage.

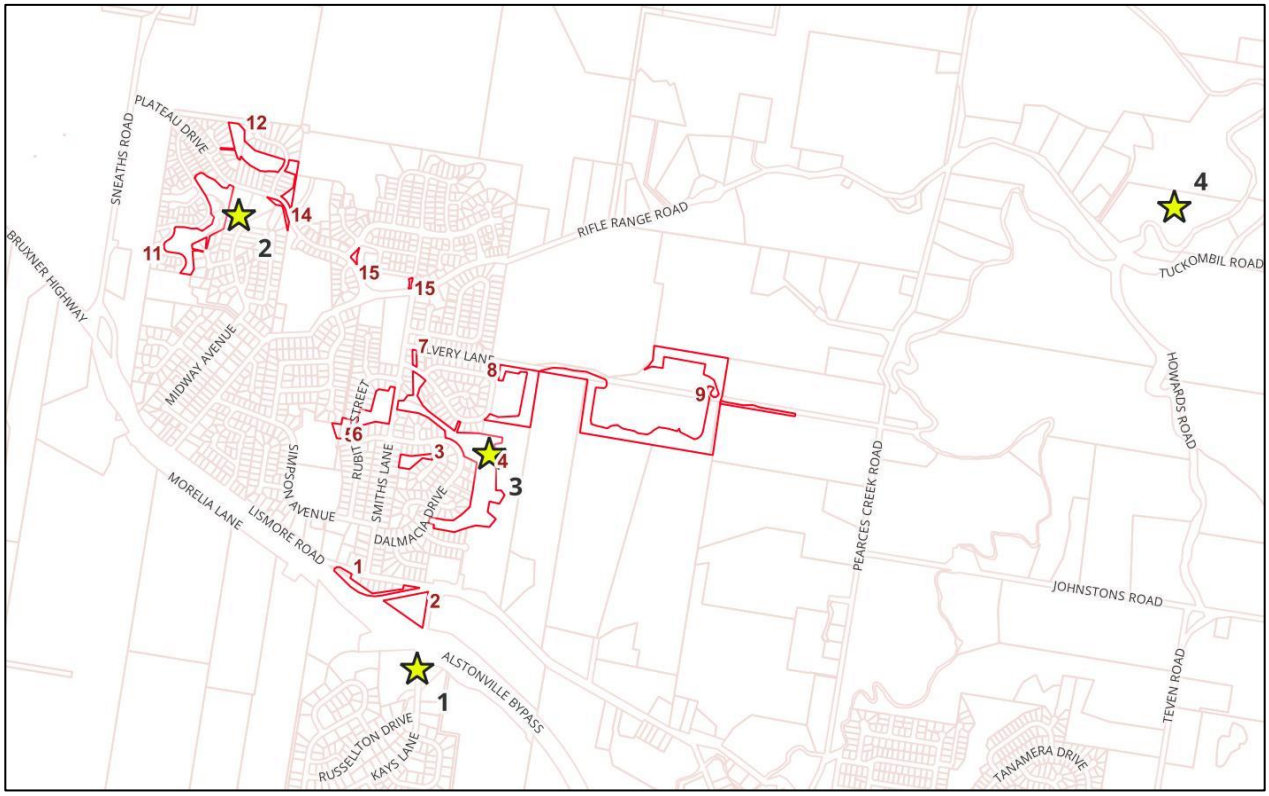

Figure 8: Four sites of significance to Aboriginal people have been recorded close to the subject site. Locations are approximate.

4.1 Cultural Heritage Act 2018

Jali Local Aboriginal Land Council (LALC) is the consultative body for indigenous related matters within Ballina Shire. Consultation with the Jali LALC should occur prior to undertaking any works that involve disturbance of the ground surface (with the exception of planting works) to ensure protection of cultural objects or sites.

While the proposed works will create minimal disturbance, artefacts could be encountered during restoration works. In the event that any Aboriginal artefacts, skeletal remains or shell midden materials are encountered, works are to stop, and local Jali Local Aboriginal Land Council is to be notified immediately. Works are not to commence until Jali LALC gives approval. In some cases, an Aboriginal Heritage Impact permit may be required before works can continue.

5. EXISTING RESTORATION PLANS and WORKS

The following plans have been previously prepared for some of the sites included within this Plan. The plan extents are illustrated on **Figure 10.**

5.1 Bushland Rehabilitation and Management Plan for 7(d) zoned land Wollongbar Urban Expansion Zone

This plan by Aspect North was written in 2005. At that time, the future population of Wollongbar was estimated to increase significantly, and the area known as the Wollongbar Urban Expansion Area (WUEA) was selected over rural farmland to accommodate this growth in residential development. The area was generally north of Bruxner Highway, east of Sneaths Road and north-west of Rifle Range Road. Ballina Shire Council rezoned the area to accommodate residential development within 2(b) Village Area zoned land, protect environmentally significant land within 7(d) Environmental Protection (Scenic/Escarpment) and provide open space and community facilities within 6(a) Open Space zoned land.

The BRMP proposed restoration measures to rehabilitate specific areas of the study site that were degraded but had regeneration potential and were rezoned to 7(d) Environmental Protection (Scenic/ Escarpment), including Willowbank Creek and its tributaries. The Plan outlined detailed actions, timetables, responsibilities, monitoring and reporting mechanisms and costing over a ten-year planning timeframe for each of the eleven work zones.

The Wollongbar Urban Expansion Area has now been developed through residential subdivisions and exists as the area surrounding Plateau Drive and north of Rifle Range Road. Zones 8 and 9 of the BRMP are generally included in this VMP as **Site 11**, while Zone 7 is included as **Sites 12, 13 and 14**. Recent analysis of the sites indicates that weeds are still problematic in those zones. Zones 1 to 6 and 11 of the BRMP along Willowbank Creek in the north are outside the currently developed area and are not included in this plan. Zone 10 is west of the current residential footprint.

A Revised Rehabilitation Action Plan- Wollongbar Park Estate was produced by LandPartners in 2010 which made amendments to the areas of the zones now known as **Sites 11 and 12**.

5.2 Amended Rehabilitation Action Plan for 7(d) Zoned Land – Wollongbar Park Estates

This plan by Land and Fire Assessments reviewed and updated the above plans in 2015 as it affected the Wollongbar Park Estate, including **Site 11**, the western end of **Site 12** and **Site 14**. It amended the area of Site 12 to reduce the area of public reserve and retain some cleared land in private ownership. Weeds along the drainage line were to be controlled, including Camphor Laurel removal or treatment, native sedge species were to be retained and the area enhanced with Mat-Rush. Lilly Pilly and Sandpaper Fig were to be planted not closer than 2m from the footpath. Additional dense mixed rainforest plantings were required in parts of Site 11, 12 and 14.

Untreated Camphor Laurel trees remain in Sites 11, 12 and 14, and the drainage lines have very few native sedges or riparian species present as Broad-leaved Paspalum and annual weeds predominate.

This plan applied bushfire protection buffers to neighbouring residential land which had not had asset protection zones imposed on the residential lots. Planting of tree species was not closer that 8m from the neighbouring properties.

5.3 Vegetation Management Plan Proposed Residential Development Plateau Drive, Wollongbar

This plan was written by Ardill Payne and Partners in 2012 and relates to the Mount Moriah subdivision north of Plateau Drive. It proposes the rehabilitation and vegetation management of designated areas within lands zoned 7(d) Environmental Protection (Scenic/ Escarpment) of the development site. The plan divides this area into areas suitable for assisted regeneration, infill planting, open space and stormwater infrastructure. The plan aims to establish 80% cover of native subtropical rainforest species in the rehabilitation zones, which equate to **Sites 12 and 13** (in part) of

this VMP. Site 13 does not appear to have been planted as expected, or else plants have been subsequently lost. Site 12 contains dense weed growth within the drainage line.

5.4 Wollongbar Drainage Reserve Restoration Plan

This plan by Bob Moffatt written in 2001 referred to the northern part of **Site 4,** north-east of the original Wollongbar Rainforest Reserve. It proposed restoration actions within the drainage reserve, which was dominated by invasive weeds at the time, particularly Camphor Laurel and Large-leaved Privet. Planting was undertaken to expand remnant vegetation and remains at present, but little weed control has been done since, apart from mowing/ slashing of the drainage area.

5.5 HCV Vegetation Restoration Action Plan – Wollongbar Rainforest Reserve

The Restoration Action Plan was written by EnviTE in 2005 and funded by the Natural Heritage Trust. It refers to the southern portion of **Site 4**, the largest rainforest remnant in the subject site, situated off Dalmatia Drive. Wollongbar Rainforest Reserve represents a true urban remnant of the Big Scrub, as the surrounding areas have been progressively cleared of native vegetation for logging, farming and residential development. The Action Plan divided the area into eight zones for restoration actions and one of the objectives was to encourage community participation in care of the reserve.

A Landcare Group was subsequently formed and worked in the reserve for some years but have now disbanded. The reserve requires maintenance to control weeds and repair infrastructure, including a walking track and creek crossing.

5.6 Planting and Maintenance Plan for the Biological Buffer Wollongbar Sports Field

The sports field site is located in Elvery Lane, off Ramses Street in Wollongbar. At the time of development, a Land Use Conflict Risk Assessment (LUCRA) was prepared, which identified potential conflicts arising in relation to adjoining land use practices. Horticultural land (macadamia cropping) directly adjoins the sportsfield site to the east and south (**Figure 15**). Spray drift from adjoining properties was identified as an issue to be addressed using vegetative 'biological' buffers. The plan was written by EnviTE in 2011 when a 30m buffer (shown below prior to development) was planted with local native rainforest species.

The site was maintained for five years until the trees and shrubs established, but little maintenance work has occurred since. This plan considers this area and future maintenance recommendations under **Site 9**. The planting was successful and a low canopy exists with few weeds present.

Figure 9: Biological buffer planted around the area that is now Wollongbar Sports Field. Large Moreton Bay Fig trees were retained.

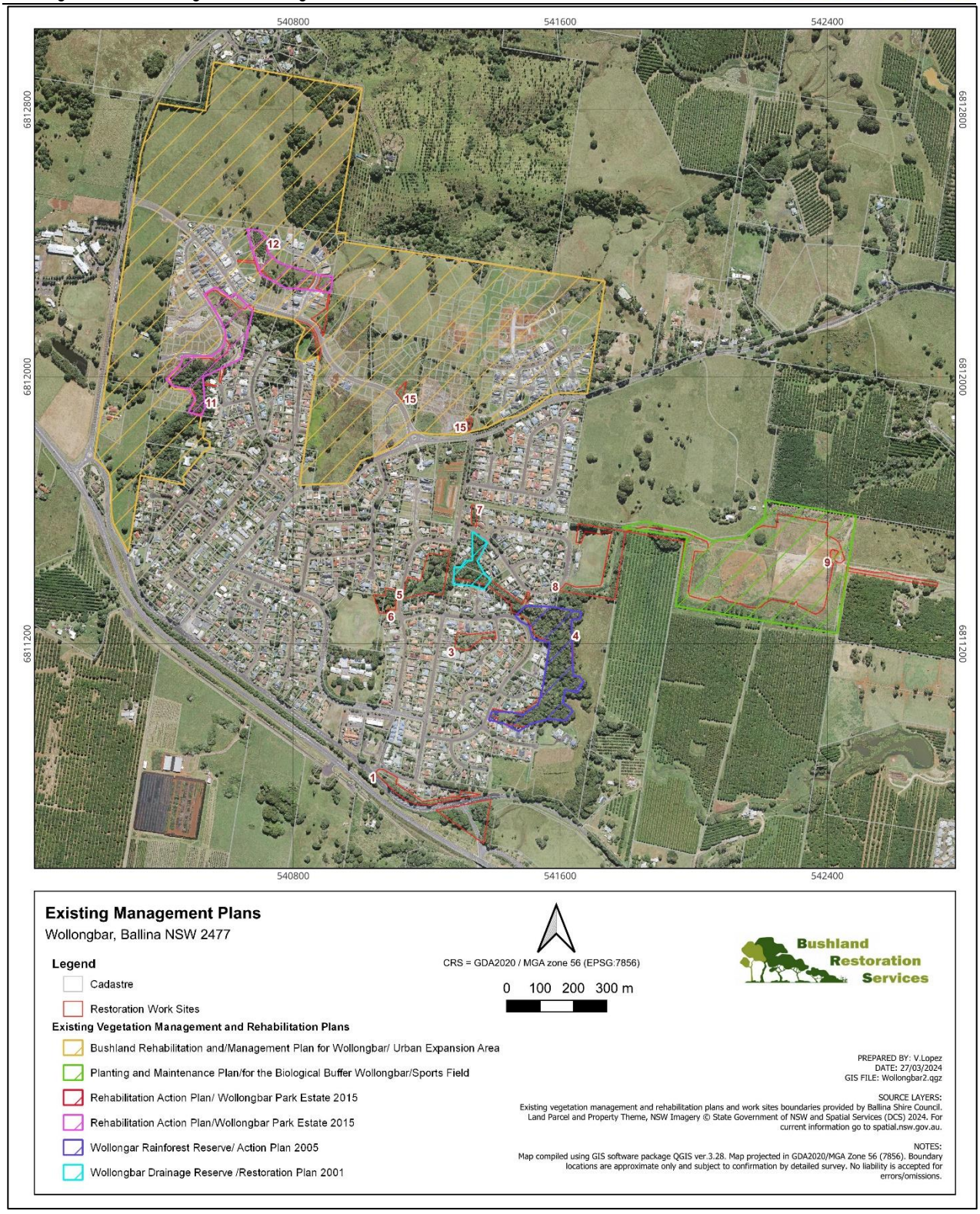

Figure 10. Existing vegetation management and rehabilitation plans in relation to proposed restoration work sites.

6. EXISTING INFRASTRUCTURE and CONSTRAINTS

Existing assets and potential constraints to restoration actions are listed below and discussed within the individual site descriptions in Section 3.

6.1 Sportsfields

Ballina Shire Council managed sports fields occur at Lyle Park and Wollongbar Sports Fields. Additional pressure may arise from human visitation; however, the fields and carparks are well -defined and remnant vegetation is not likely to be subject to damage or removal as a result. Enhancement of vegetated buffer areas is proposed by this plan.

6.2 Walkways

Walkways between residential dwellings provide pedestrian access to Sites 4, 11 and 12. Parks are public use areas and various pathways and facilities occur within the recreational zone of Wollongbar District Park.

Site 10 is a formed road reserve managed by Ballina Shire Council.

6.3 Residential housing

Apart from Sites 2, 8, 9 and 10, all of the sites are adjacent to residential housing allotments. Some inappropriate plantings have been undertaken on Council land, with weed encroachments occurring from garden escapees. Restoration work will focus on removal of exotics. The main threat to the reserves is environmental weed encroachment. Residential encroachment, exotic planting, garden dumping and stormwater discharge are also issues. Some clearing is noted behind houses, apparently to form fire protection zones.

It is recommended to erect signage at strategic locations to indicate 'bush regeneration works in progress – please keep out/ no garden dumping' and to hold workshops to educate local residents as to the reserve values as natural areas.

6.4 Pipelines

Water, sewer and recycled water supply pipelines run near or through a number of the reserves subject to this VMP. Where services occur within reserves, they are noted in the individual site details in **Section 8**. Any future plantings should be avoided within 3 metres of pipeline and infrastructure locations due to the need for maintenance access. Lomandra can be planted as a ground cover within the buffer zone up to the pipelines. For maps of pipelines, wastewater and stormwater assets please refer to Ballina Shire Council.

6.5 Bushfire Management

Much of the Wollongbar residential area was constructed prior to the introduction of the Rural Fire Service *Planning for Bushfire Protection Guidelines* requirement for asset protection zones to be wholly provided on residential land, or else the APZ's were not applied. Sites containing natural or planted bushland or regrowth generally have no separation from residential backyards and this has led to some clearing and mowing of Council-owned reserves, as well as planting of formerly cleared land. Bushfire-prone land is indicated on **Figure 11**; however, this mapping is due to be updated.

Orange is Category 1 (highest risk) vegetation, yellow is Category 2 and the green line is the bushfire buffer. Site 4 and parts of sites 8 and 11 are mapped as Category 1. The buffer area partially affects site 4, 5, 8, 11 and 12.

While mapped Site 1 contains some planted non-native Eucalypts, mapped sites 4, 11 and 12 are riparian rainforest considered better described as Category 2 vegetation. This mapping is yet to be updated to reflect revised guidelines. Sites 11 and 12 provided unplanted buffers of 8 metres on the edges of reserve land where residential properties abutted the boundaries. This represented an 8m separation at the mature stage of any species.

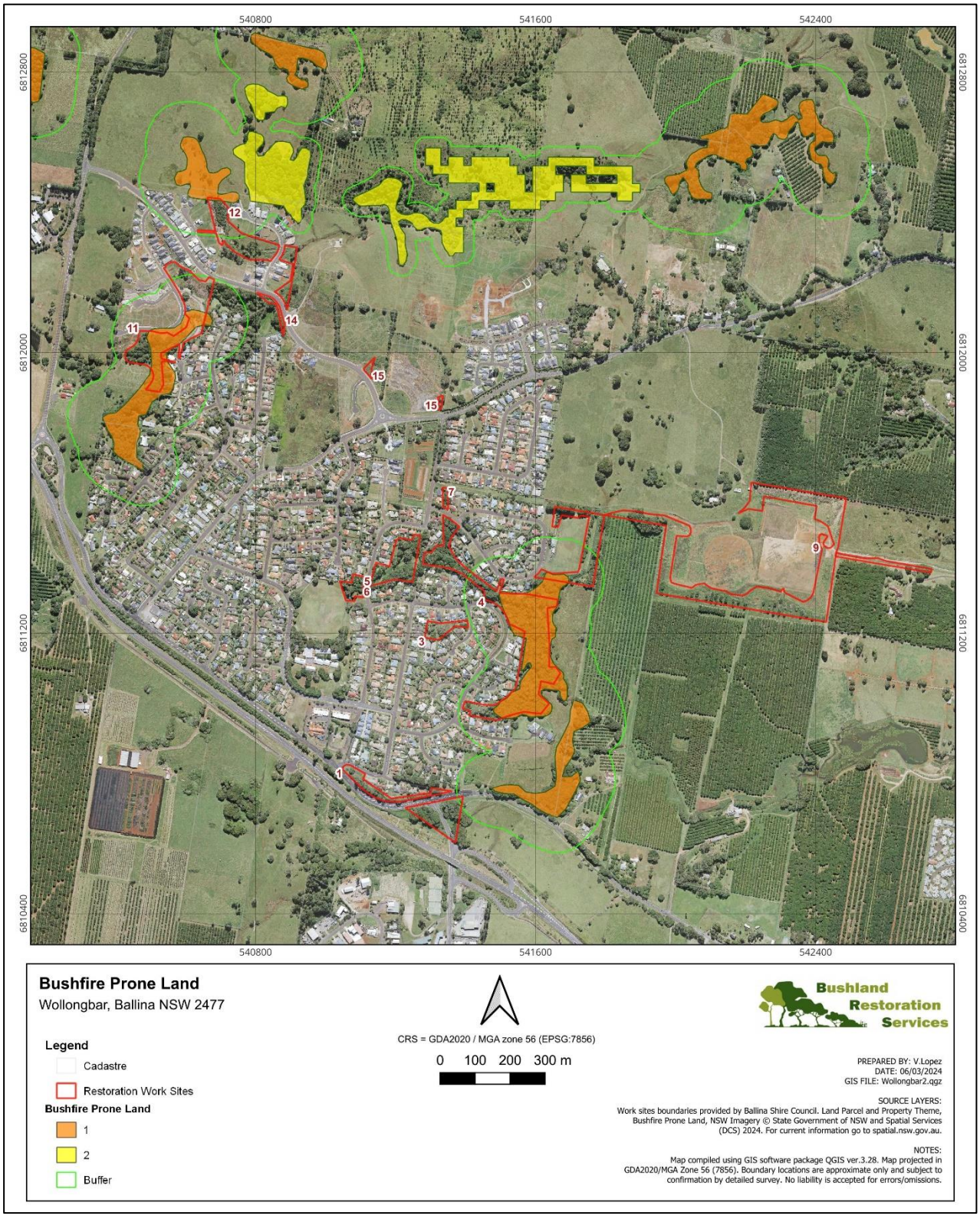

Figure 11: Bushfire prone land and restoration work sites.

7. FLORA SURVEY

Site survey was undertaken in August and September 2022 and again in January 2023 to ascertain vegetation community types, condition, dominant weed species, and habitat values. Surveyed flora was classified into vegetation communities by dominant species, vegetation height, percentage vegetation cover (%) and structural formation.

A description of all surveyed vegetation communities is provided below and a comprehensive list of all flora species by site recorded during field survey has been compiled in **Appendix 1**.

7.1 Vegetation Communities

A total of four vegetation community (VC) types were recorded during field survey within the subject sites as listed below (See **Figure 19**):

1. Remnant Subtropical Rainforest including Blue Quandong *Elaeocarpus grandis*, Red Apple *Acmena ingens*, Red Cedar *Toona ciliata*, Hoop Pine *Araucaria cunninghamii*, Cudgerie *Flindersia schottiana*, White Booyong *Argyrodendron trifoliolatum* and Strangler Fig *Ficus watkinsiana.*

2. Regrowth Subtropical Rainforest including Guioa *Guioa semiglauca*, Red Kamala *Mallotus philippensis*, Native Elm *Aphananthe phillippensis*, Bangalow Palm *Archontophoenix cunninghamiana,* and Foambark *Jagera pseudorhus* var. *pseudorhus.*

3. Established Rainforest plantings including Hoop Pine and Rosewood *Dysoxylum fraserianum.*

4. Garden Plantings including native, non-local native and exotic species.

Remnant Subtropical Rainforest is the primary vegetation community within the sites surveyed. While the Wollongbar Rainforest Reserve (Site 4) consists of remnant vegetation with old-growth trees and threatened flora species, the remainder of the sites containing rainforest are represented by regrowth vegetation or established native plantings. The description below is for Site 4, while the latter are described under Vegetation Community 2. Each of the sites is invaded by exotic species.

Vegetation Community 1: Remnant Subtropical Rainforest – Site 4

Description: White Booyong/ Blue Quandong/ Rosewood/ Hoop Pine/ Cudgerie Tall Closed Forest.
Equivalent Plant Community Type: PCT 3001: Lismore Basalt Subtropical Rainforest.

Wollongbar Rainforest Reserve contains a very tall dense rainforest on fertile soils derived from basalt. Tree species richness is very high, and the tree canopy is of variable composition, however White Booyong *Heritiera trifoliolata* is among the tree species with the highest foliage cover. Other very frequent canopy trees include Black Bean *Castanospermum australe*, Blue Quandong, Rosewood, Red Apple, Bangalow, Red Cedar, Hoop Pine, Cudgerie, Strangler Fig, Native Tamarind *Diploglottis australis,* Maidens Blush *Sloanea australis*, Pepperberry *Cryptocarya obovata*, and Myrtle Ebony *Diospyros pentamera*. A wide range of other rainforest tree species occur with lower frequency. Canopy weeds include Queensland Umbrella Tree and Camphor Laurel, with Coral Tree present on edges.

The mid-stratum is of very mixed composition with no single species dominant, however it includes Veiny Wilkiea *Wilkiea huegeliana*, Twin-leaved Coogera *Arytera distylis,* Red Kamala, Guioa, Brush Bloodwood *Baloghia inophylla*, Peanut Tree *Sterculia quadrifida*, Red-barked Sassafras *Cinnamomum virens,* Red-fruited Laurel *Cryptocarya laevigata,* Breynia *Breynia oblongifolia* and Red-fruited Palm-lily *Cordyline rubra.* Vines are abundant and include Lawyer Vine *Calamus muelleri,* Water Vine *Cissus antarctica,* White Supplejack *Ripogonum album,* Burny Vine *Trophis scandens,* Whip Vine *Flagellaria indica,* Common Silkpod *Parsonsia straminea* and the Richmond Birdwing Butterfly Vine *Pararistolochia praevenosa.* The climbing epiphyte Pothos *Pothos longipes* is abundant and Staghorn *Platycerium superbum*, Elkhorn *Platycerium bifurcatum* and Birds Nest Fern *Asplenium australasicum* are common in parts. Weeds include Golden Rain Tree, Large-leaved and Small-leaved Privet, Ochna, Queensland Umbrella Tree, Cocos Palm,

Lantana, and Murraya, with Winter Senna on edges. Climbing Asparagus is dense in part.

The ground stratum contains Basket Grasses *Oplismenus imbecillis*; *O. aemulus* and *Ottochloa gracillima*, Aneilema *Aneilema biflorum*, Plectranthus *Plectranthus graveolens,* Pollia *Pollia crispata,* the Mat-rushes *Lomandra hystrix* and *Lomandra longifolia,* Dianella *Dianella caerulea* and Kidney Weed *Dichondra repens.* Ferns are common and include Binung *Christella dentata* Harsh Ground Fern *Hypolepis muelleri,* Rough Maidenhair Fern *Adiantum hispidulum,* Soft Bracken *Calochlaena dubia* and Bracken Fern *Pteridium esculentum.* Weeds include Green and Silver-leaved Desmodium, Crofton Weed, Mist Flower, Blue Billygoat Weed, Impatiens, Freckle Face, Hairy Commelina and Trad. Vines include *Pandorea pandorana* and Slender Grape *Cayratia clematidea.*

Threatened species	*Acalypha eremorum, Macadamia tetraphylla, Rhodamnia rubescens, Rhodamnia maideniana, Syzygium moorei and Tinospora tinosporoides.* *Pararistolochia pravenosa* is a food plant for the threatened Richmond Birdwing Butterfly *and Carronia multisepalea* is a larval food plant for the threatened Pink Underwing Moth.
Condition summary:	Mature community with good canopy coverage (apart from edges), four vegetation layers including emergent trees, abundant vines, ferns and epiphytes and significant regeneration evident in lower stratums. Weed infiltration is moderate in all layers, particularly in canopy gaps.
Focus areas:	Control woody weeds and vines in the upper and mid layers and ground covers in the lower layer. Control current areas of Mistflower and Crofton Weed infiltration near Camphor Laurel stand and forest edges. Drainage line is open where stormwater drainage occurs in the upper Site 4 and 5 and could be planted with sedges and rushes within the flow channel and species such as Creek Sandpaper Fig *Ficus coronata*, Giant Water Gum *Syzygium francissi* Black Bean and Bangalow Palm to reduce erosion and the mown area.

Vegetation Community 2: Regrowth Subtropical Rainforest – Sites 2, 5, 6, 11, 12, 13 and 14

Description: Guioa/ Foambark/ Rose Walnut/ Red Kamala Riparian Closed Forest.
Closest Plant Community Type: PCT 3148: Far North Brushbox Walnut Wet Forest.

This vegetation community is a tall, mid-dense rainforest, where a dense mixed mesic sub-canopy or mid-storey has become dominant in the absence of the former Camphor Laurel canopy. The canopy generally lacks Brushbox or sclerophyll species. It includes the small trees Guioa, Red Kamala, Rough-leaved Elm, Bangalow Palm, Foambark, Veiny Wilkiea, Cudgerie and Scentless Rosewood *Synoum glandulosum*. Native Sarsparrilla *Smilax australis*, Sweet Morinda *Gynochthodes jasminoides* and Scrambling Lily *Geitonoplesium cymosum* are present, commonly with *Endiandra* and *Cryptocarya* species.

Threatened species	*Rhodamnia rubescens, Rhodamnia maideniana, Macadamia tetraphylla.*
Condition summary:	Immature regenerating and planted community with good canopy coverage (apart from wet drainage lines), three vegetation layers, occasional vines, ferns and epiphytes and minor regeneration evident in lower stratums. Weed infiltration is high in all layers, particularly in canopy gaps. Camphor Laurel remains in the canopy in many sites and drainage lines are dominated by Broad-leaved Paspalum and annual weeds.
Focus areas:	Control woody weeds in the upper and mid layers and grasses and ground covers in the lower layer. Stormwater drainage lines could be planted with sedges and rushes within the flow channel and species such as Sandpaper Fig, Giant Water Gum, Black Bean and Bangalow Palm to reduce erosion and the mown area.

Vegetation Community 3: Established Planted Rainforest – Site 6, 9 and 10.

Rainforest plantings have been undertaken surrounding Site 6 Rubiton Park, Site 9 Wollongbar Sports Fields and Site 10 along the road reserve beyond the sports fields. These are generally established native species and are described in more detail for the individual sites in **Section 8**, with species lists in **Appendix 1**.

Vegetation Community 4: Other Plantings – Sites 1, 3, 7, 8 and 15.

Plantings within parkland are of mixed native and exotic origin as described for the individual sites in **Section 8**. While vegetation buffer plantings around Site 15 Wollongbar District Park consist of local native rainforest species, they are yet to become established.

7.2 Weeds / Introduced Plants

A wide range of exotic and non-endemic weed species of all growth forms, tree, shrub, vine, groundcover and grass, were recorded during the vegetation survey (**Appendix 1,** listed per site).

A total of eighty-two (82) weeds species were recorded during the survey and included all growth forms (i.e. tree, shrub, vine, groundcover / grass). The dominant weed species in each vegetation type are included above.

Biosecurity Act (NSW) 2015

The *Biosecurity Act 2015* and Regulations streamline the way weeds are managed in NSW, with specific legal requirements for State level priority weeds and Regional high risk priority weeds. In keeping with its premise that biosecurity is a shared community responsibility, the 2015 Act introduces the legally enforceable concept of a General Biosecurity Duty.

For weeds *'the General Biosecurity Duty means that any person dealing with plant matter must take measures to prevent, eradicate or minimise / contain the biosecurity risk as far as reasonably practicable*'.

Plant matter includes plants, parts of plants and seeds. Dealing has a broad definition in the Act and includes (but is not limited to) activities such as grazing, cropping, fodder production, horticulture, weed control, seed and other plant production, as well as carrying, sale and distribution of these products as part of a commercial, professional, volunteer or recreational activity or lifestyle.

North Coast Regional Strategic Weed Management Plan 2023-2027

The *North Coast Regional Strategic Weed Management Plan 2023-2027*, while not a regulatory document, plays an important role in articulating the shared responsibility principle of the *Biosecurity Act 2015* (the Act) to regulators, stakeholders, public agencies and the wider community. It provides necessary information to enable people to effectively meet the requirements of the General Biosecurity Duty and discharge their obligations under the Act.

The State level priority and Regional high risk priority weeds identified in the sites within each Vegetation Management Site during field survey are listed in **Table 2** alongside the applicable management category stipulated in the *North Coast Regional Strategic Weed Management Plan 2023-2027*. The weed control strategy and methods for the removal of these priority weeds are detailed in **Section 8** of this plan.

Table 2– State level priority (annotated "S") and Regional high-risk priority (annotated "R") weeds

Common Name	Scientific Name	Management Category				
		PREVENT	ERADICATE	CONTAIN	ASSET PROTECTION	WATCH
Camphor Laurel	*Cinnamomum camphora*				**R**	
Cecropia	*Cecropia peltata*		**R**			
Cocos Palm	*Syagrus romanzoffianum*				**R**	
Coral Berry	*Rivina humilis*				**R**	
Crofton Weed	*Ageratina adenophora*				**R**	
Giant Devils Fig	*Solanum chrysotrichum*			**R**		
Climbing Asparagus	*Asparagus africanus*				**S**	
Indian Coral Tree	*Erythrina sykesii*				**R**	
Lady of the Night	*Cestrum nocturnum*				**R**	
Lantana	*Lantana camara*				**S**	
Mickey Mouse Plant	*Ochna serrulata*				**R**	
Mock Orange	*Murraya paniculata*				**R**	
Passionfruit	*Passiflora* spp.				**R**	
Small-leaved privet	*Ligustrum sinense*				**R**	
Umbrella Tree	*Schefflera actinophylla*				**R**	

Source: *North Coast Regional Strategic Weed Management Plan 2023-2027*

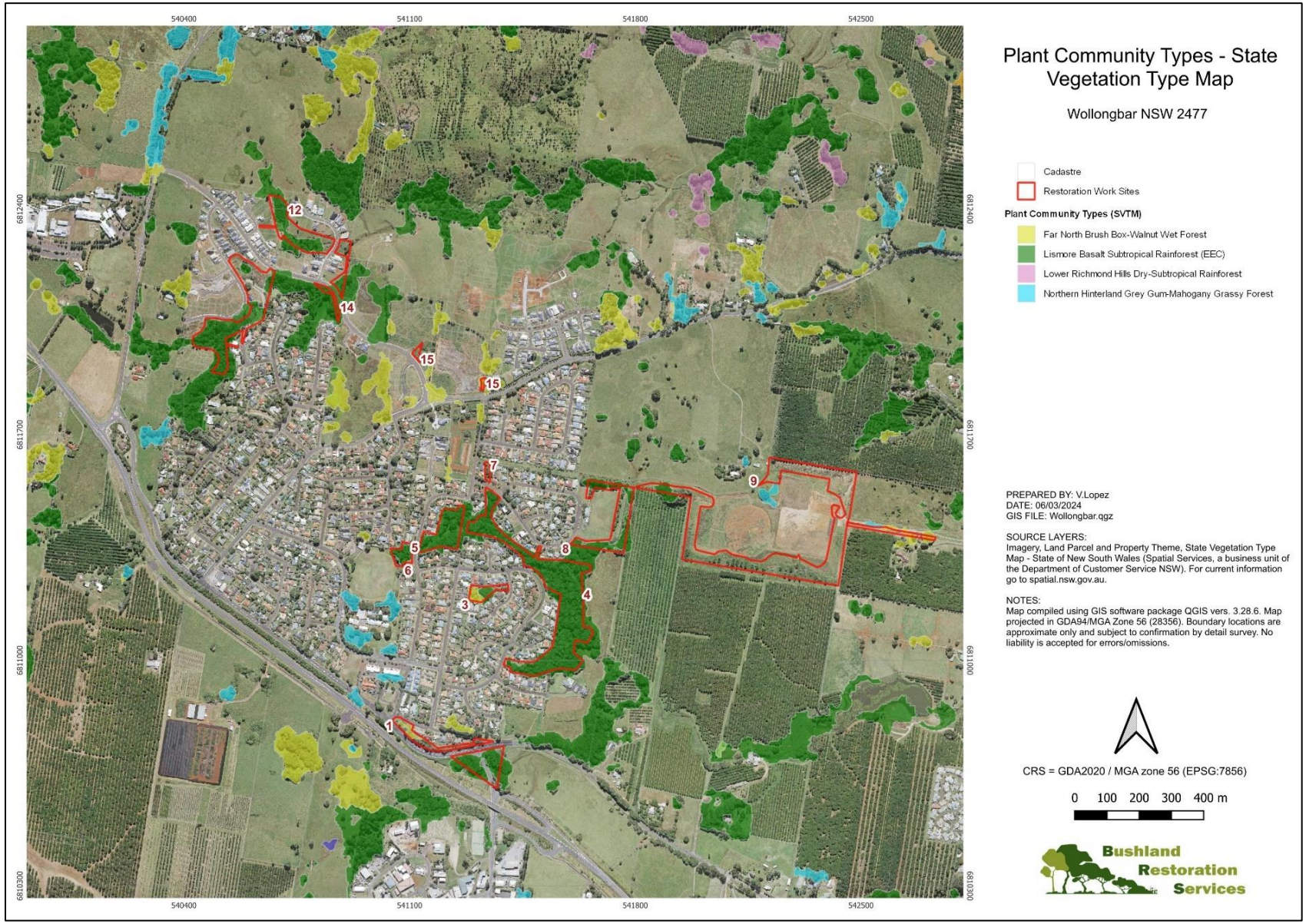

Figure 12: Plant Community Types (State Vegetation Type Map).

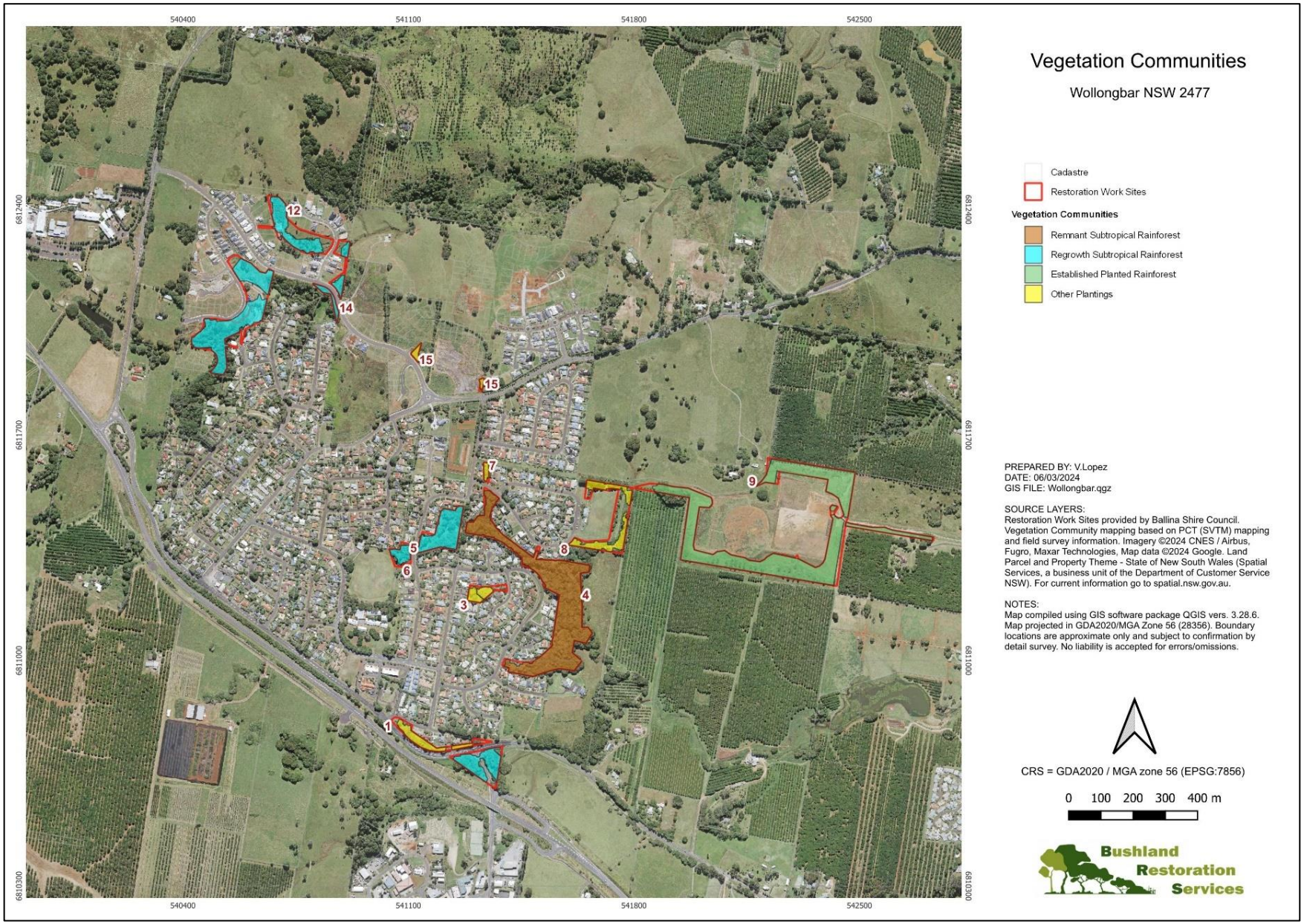

Figure 13. Vegetation Communities.

8. RESTORATION STRATEGY

8.1 Restoration Approach

The rehabilitation strategy in this plan is derived from the common approaches described below in **Table 3**. The selection of a suitable approach depends on the degree of resilience that is present in the existing native vegetation and/or seed bank, as well as the nature and extent of disturbance including weed infestation. A flow chart has been used to guide the selection of a suitable ecological restoration approach for each management zone. See Figure 14.

Table 3 – Common ecological restoration approaches

Restoration Approach	Application
Natural Regeneration	Where resilience is intact, and recovery is automatic with the removal of the cause of damage.
Assisted Natural Regeneration	Where degrees of resilience exist and "triggered" interventions (either disturbance or resource provision) can affect recovery by natural regeneration.
Reconstruction (Revegetation)	Where resilience is depleted, and abiotic or biotic elements need wholesale importation or major amendment before recovery can commence.
Fabrication (Type Conversion)	Where conditions are permanently changed and better-adapted local systems can be regenerated or constructed to restore integrity to the landscape.

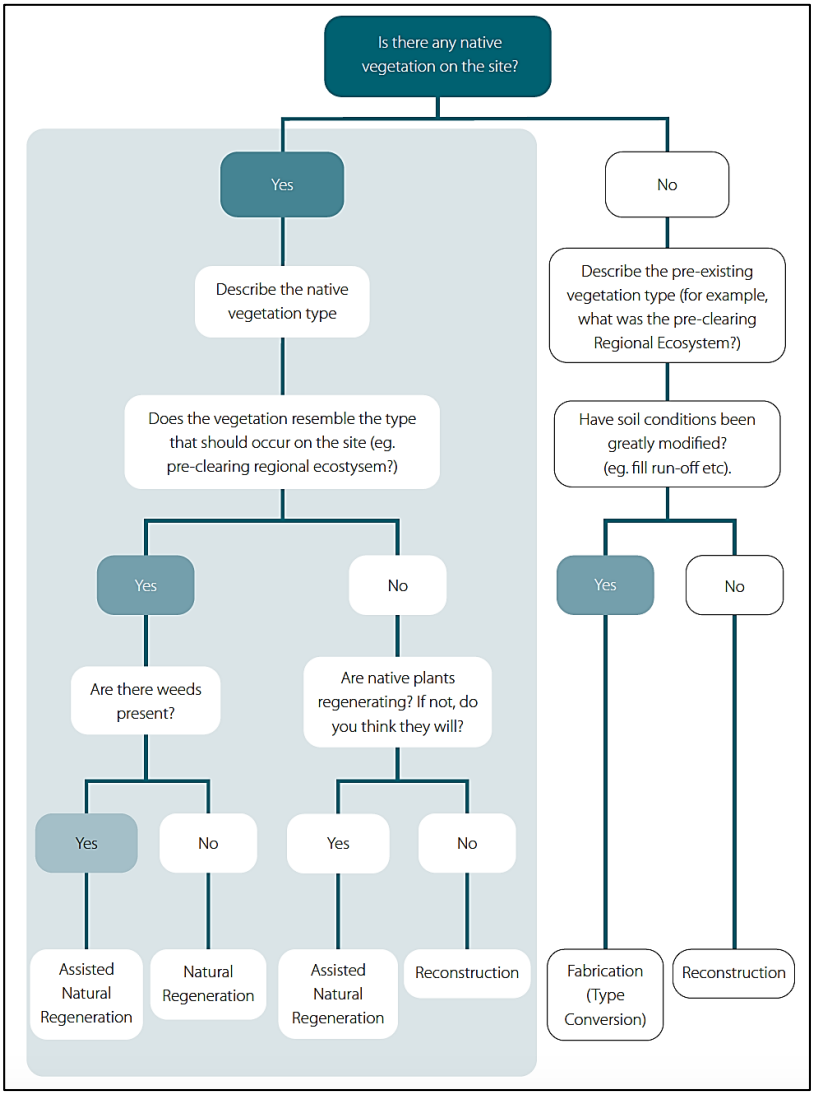

Figure 14: Selection of restoration approach. Source: Chenoweth EPLA & BRS 2012

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Figure 15: Aerial view of sites 1 to 10.

Figure 16: Aerial view of sites 11 to 15.

8.2 Restoration Works

The following section includes maps, descriptions, photographs, recommendations and restoration activities proposed for the fifteen subject sites to be restored. A full species list for each site is included in **Appendix 1**. Proposed species for planting and specifications for weed control are contained in **Section 8.3.**

8.2.1 Site 1: Bruxner Buffer (0.5878ha)

Figure 17: Site 1.

Description

This site is located between Lismore Road and the rear of residences in Smiths Lane and Bewers Close in Wollongbar. It consists of mown grassland parks at either end (Zones 1a and 1c), which then run to weedy rainforest regrowth occupying the majority of the site in between (Zone 1b). The Bruxner Highway frontage is Operational Land while the mown parkland is Community Land. The site includes a small rock-edged garden bed planted with Grevillea cultivars and currently has advertising signage at the corner of Lismore Road. A concrete footpath extends past the eastern park and joins to a shared pathway connecting to Alstonville. An overhead power line runs through the northeast corner of the site.

Features of this site include large Hoop Pines and a large Rosewood within the western mown park, along with a patch of Camphor Laurel-dominated regrowth rainforest occupying the western half of the reserve. The site contains many more weed species than natives, with the rainforest regrowth dominated by Camphor Laurel, Large-leaved Privet, Lantana and Passionfruits. A line of the North Queensland species Cadaghi has been planted approximately 10m from rear fences. Evidence of dumping of garden waste is present in the west.

Plate 2: Large Hoop Pines (left) and Rosewood (right) are features of Site 1.

Plate 3: Line of planted Cadaghi (left) and advertising signage (right) near Smith Lane entrance.

Plate 4: Weeds amongst scattered native trees in the western half of the reserve.

Recommendations

- Zones 1a, 1c (mowed grass areas) – Retain the open parkland with scattered trees. Plant with subtropical rainforest species, leaving a 10m unplanted zone adjacent rear and side fences to act as a bushfire asset protection zone.
- Site 1b has high weed infestation and therefore Assisted Natural Regeneration is the recommended ecological restoration approach, along with revegetation to reduce mown areas and increase connectivity. Significant bush regeneration work is required in the west where Camphor Laurel dominates the canopy and Large-leaved Privet dominates the understorey.

- As it is a highly visible site, planting of small and colourful or feature local rainforest species in Zone 1c up to 10m from rear boundaries is recommended using species listed in **Table 5**, for example: Flame Tree *Brachychiton acerifolius,* Native Frangipani *Hymenosporum flavum,* Firewheel Tree *Stenocarpus sinuatus,* Tree Waratah *Alloxylon pinnatum*. Ensure buffer from vegetation to power line is maintained with any new plantings.
- Felling, and chipping or removal of semi-mature non-local Eucalypts, *Corymbia torelliana* and *Corymbia maculata* in Site 1 is recommended due to their potential to increase fire risk, potential risk from limb drop in a public area used as parkland, and their unsuitability for the regrowth rainforest community on the site. Stem injection is not recommended here due to risk of fall in proximity to adjoining residences and community use.
- Commence work in Site 1c along the roadside strip, working into 1b and to the 1c, controlling all weeds encountered.

Table 4 – Summary of restoration actions for Site 1

Work Sequence	Dominant Weed Species	Actions	Work Area
Primary Work Zone 1b (Year 1)	Cocos Palm Camphor Laurel Slash Pine Murraya Lantana Lady-of-the-night Privet species Metrosideros Tibouchina	▪ Work systematically and comprehensively through the zone commencing from the west and. continue work following this line eastwards to complete the zone. ▪ Cut, scrape and paint (CSP) woody weeds such as Lantana, Privet, Camphor Laurel, and other woody weeds encountered. ▪ Lop cut stems to reduce trip hazard or allow access for bush regen team if necessary. ▪ Leave treated Lantana frames and other woody weeds in place to break down gradually. ▪ Smaller plants can be hand pulled. ▪ Drill and inject larger exotic trees such as Camphor Laurel.	0.5ha
	Morning Glory Passionfruit species	▪ Cut Morning Glory and other exotic vines at shoulder height, cut, scrape and paint the base of the plant with herbicide. Dense leafy stems can be pulled down or cleared from native shrubs intact and bundled to spray. Small or shallow rooted specimens can be hand pulled.	
	Exotic grasses Crofton Weed Blue Billygoat Weed	▪ Clear exotic grasses and groundcovers around small native plants prior to spray to prevent off-target damage. ▪ Spot spray all exotic grasses, herbs and groundcover weeds throughout the zone, working thoroughly and systematically as described in primary work above. Follow up the spot spray every 3 months depending on season and prevailing weather conditions.	
Follow Up (Years 2 & 3)	Regrowth of woody weeds, exotic vines, grasses and groundcovers	▪ Follow up spot spray (approx. 4 visits / year depending on season and prevailing weather conditions). Encourage recruitment of native species by well-timed control of weeds.	0.5ha
Maintenance (Years 4 & 5)	Regrowth of woody weeds, exotic vines, grasses and groundcovers	▪ Follow up spot spray (approx. 2-3 visits / year depending on season and prevailing weather conditions. ▪ Encourage recruitment of native species by well-timed control of weeds.	0.5ha

Table 5 – Suggested species for planting in Site 1

Scientific Name	Common Name
Alloxylon pinnatum	Tree Waratah
Archidendron grandiflorum	Pink Laceflower
Atractocarpus charteus	Narrow-leaved Gardenia
Brachychiton acerifolius	Flame Tree
Cryptocarya laevigata	Glossy Laurel
Cupaniopsis flagelliformis var. *australis*	Brown Tuckeroo
Diploglottis australis	Native Tamarind
Ficus fraseri	Forest Sandpaper Fig
Gossia bidwillii	Python Tree
Homalanthus populifolius	Bleeding Heart
Hymenosporum flavum	Native Frangipani
Stenocarpus sinuatus	Firewheel Tree
Pararchidendron pruinosum var. *pruinosum*	Snow Wood
Pilidiostigma glabrum	Plum Myrtle
Syzygium leuhmannii	Riberry

8.2.2. Site 2: Lismore Road/Kays Lane (1.0471ha)

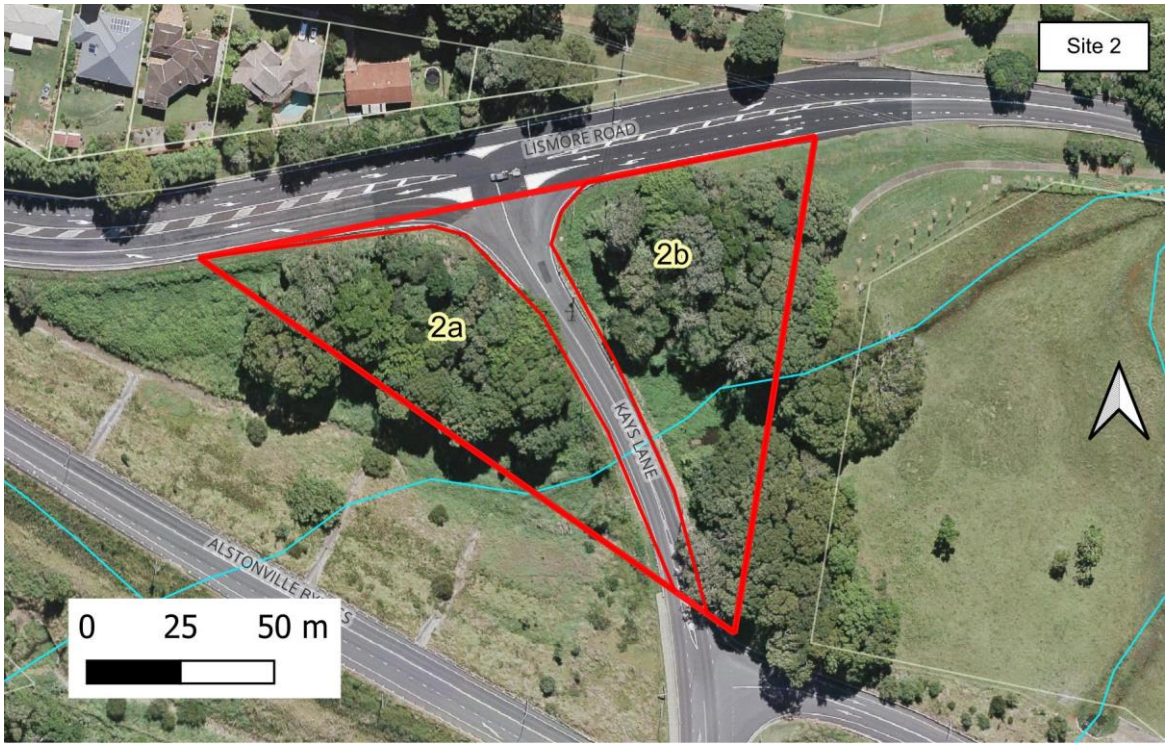

Figure 18: Site 2.

Description

Site 2 is a triangle of Operational Land fronting Lismore Road and bisected by Kays Lane. An overhead powerline runs along the eastern side of Kays Lane. The site contains subtropical rainforest dominated by Camphor Laurel, with planted Eucalypt species on part of the Lismore Road frontage.

Rainforest species present at this site are generally pioneer or early secondary species including Sally Wattle *Acacia melanoxylon*, Red Ash *Alphitonia excelsa*, Bangalow Palm, Straw Tree Fern *Cyathea cooperi*, Brown Kurrajong *Commersonia bartramia* and Foambark.

Weed species dominate the site in all strata, with Camphor Laurel the main canopy species, Privet species and Umbrella Tree in the mid-storey and exotic grasses and Morning Glory dominant in the ground layer.

Plate 5: The eastern side of Site 2 looking from Lismore Road (Zone 2b).

Plate 6: The western side of Site 2 (Zone 2a).

Recommendations

- Commence work in Site 2 from Kays Lane west and complete Zone 2a before moving to Zone 2b.
- Significant bush regeneration work is required to control weeds. Weed control should concentrate on invasive species such as Trad, Blue Butterfly Bush and African Iris.
- Planting is not recommended until the response to weed control is realised. If insufficient native species recruit, planting as per **Table 7** is recommended. For the eastern road edge under powerline, planting of low-growing species should follow weed control to avoid future problems or tree loss.
- Ensure a buffer between any new plantings and the power line is maintained.

Table 6 - Summary of restoration actions for Site 2

Work Sequence	Dominant Weed Species	Actions	Work Area
Primary Work (Year 1)	Umbrella Tree Camphor Laurel Winter Senna Murraya Lantana Large-leaved Privet Jacaranda Tobacco Bush	▪ Work systematically and comprehensively through Zone 2a and continue work in Zone 2b. ▪ Cut, scrape and paint (CSP) woody weeds such as Lantana, Privet, Camphor Laurel, Winter Senna and other woody weeds encountered. ▪ Lop cut stems to reduce trip hazard or allow access for bush regen team if necessary. ▪ Leave treated Lantana frames and other woody weeds in place to break down gradually. ▪ Smaller plants can be hand pulled. ▪ Drill and inject larger exotic trees such as Camphor Laurel, Umbrella Tree and Lantana.	1.05ha
	Morning Glory Madeira vine	▪ Scrape and Paint Morning Glory and other exotic vines. Dense leafy stems can be pulled down or cleared from native shrubs intact and bundled to spray. Small or shallow rooted specimens can be hand pulled.	
	Exotic grasses	▪ Clear exotic grasses and groundcovers around small native plants prior to spray to prevent off-target damage. ▪ Spot spray all exotic grasses, herbs and groundcover weeds throughout the zone, working thoroughly and systematically as described in primary work above. Follow up the spot spray every 3 months depending on season and prevailing weather conditions.	
Follow Up (Years 2 & 3)	Regrowth of woody weeds, exotic vines, grasses and groundcovers	▪ Follow up spot spray (approx. 4 visits / year depending on season and prevailing weather conditions). Encourage recruitment of native species by well-timed control of weeds.	1.05ha
Maintenance (Years 4 & 5)	Regrowth of woody weeds, exotic vines, grasses and groundcovers	▪ Follow up spot spray (approx. 2-3 visits / year depending on season and prevailing weather conditions. ▪ Encourage recruitment of native species by well-timed control of weeds.	1.05ha

Table 7 – Species recommended for planting under powerline Site 2

Scientific name	Common name
Alpinia caerulea	Native Ginger
Dianella caerulea	Dianella
Lomandra hystrix	Mat Rush
Lomandra longifolia	Spiny-Headed Mat Rush
Harpulia alata	Wing-leaved Tulip
Pandorea pandorana subsp. *pandorana*	Wonga Vine
Panicum pygmaeum	Dwarf Panic
Pittosporum revolutum	Hairy Pittosporum
Pilidiostigma glabrum	Plum Myrtle
Sambucus australasica	Native Elderberry

8.2.3. Site 3: County Court Public Reserve (0.374ha)

Figure 19: Site 3.

This park is located between Smiths Lane, County Court and Dalmatia Drive. Site 3 is accessed from County Court and is surrounded by houses on three sides. Neighbouring residents use the park, and some have planted fruit trees, exotics and non-local native species beyond their boundaries and within the park.

The feature of this park is a large Moreton Bay Fig *Ficus macrophylla* with native and exotic species beneath. Other natives include a Red Bean *Dysoxylum mollissimum,* Silky Oak *Grevillea robusta,* Guioa, Brush Cherry *Syzygium australis,* Riberry *Syzygium leuhmannii* and Burrawang *Lepidozamia peroffskyana*.

Exotic species include Trad, Umbrella Tree, Mango and Orange trees, Golden Cane *Dypsis lutescens* and Kentia *Howea forsteriana* Palms, Norfolk Pine *Araucaria heterophylla*, Blue Butterfly Bush *Rotheca myricoides*, African Iris *Dietes grandiflora,* Frangipani *Plumeria rubra* and Eumundi Quandong *Elaeocarpus eumundi*.

Recommendations

- Further planting is not recommended due to the potential to increase bushfire hazard; except where local rainforest species could replace non-local species (in consultation with neighbours) or where trees are sufficiently spaced apart so that mature canopies do not touch. However, the latter would make park mowing more difficult.

- Weed control should concentrate on invasive species such as Trad, Blue Butterfly Bush and African Iris.
- Further use could be encouraged through improvements such as adding clear signage indicating a public park and adding tables and chairs under the large shady fig tree.


Plate 7: A large Moreton Bay Fig tree is a feature of Site 3.


Plate 8: Park entry sign and site boundaries with residential interfaces.


Plate 9: Many non-local and exotic trees have been planted.

8.2.4. Site 4: Wollongbar Rainforest Reserve (5.1598ha)

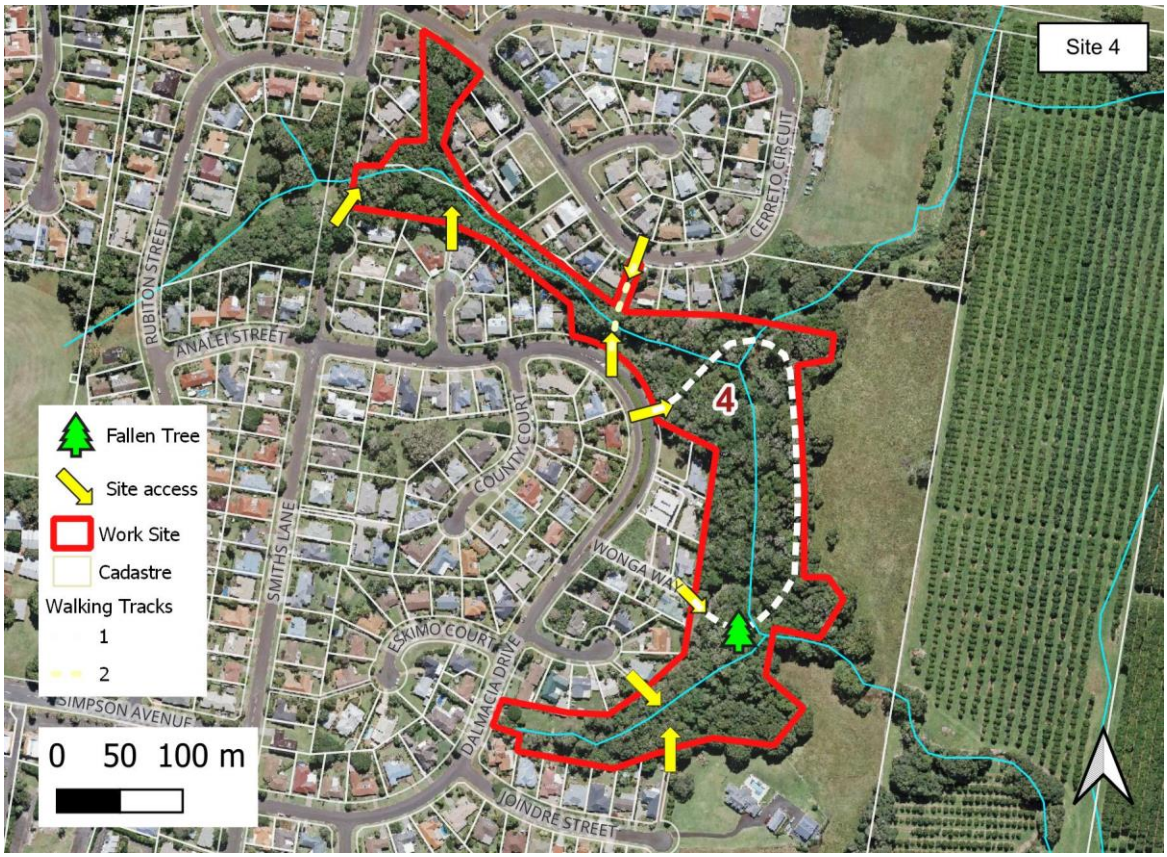

Figure 20. Site 4.

Description

Site 4 is the most significant Council reserve in Wollongbar in terms of conservation value, as it contains remnant and old growth subtropical rainforest. The reserve is mapped as 'significant urban bushland' under Ballina Shire Development Control Plan 2012. It is located off Dalmacia Drive, close to the boundary between Wollongbar and Alstonville. Access is available from Dalmacia Drive, Wonga Way, Vain Court and Smiths Lane.

This site contains the threatened flora species Rough-shelled Bush Nut *Macadamia tetraphylla*, Acalypha *Acalypha eremorum*, Arrow-head Vine *Tinospora tinosporoides*, Basket Fern *Drynaria rigidula* Scrub Turpentine *Rhodamnia rubescens* and Smooth Scrub Turpentine, along with planted Coolamon *Syzygium moorei*. Common canopy species include Blue Quandong, Red Apple, Red Cedar *Toona ciliata*, Hoop Pine, White Booyong, Cudgerie and Yellow Wood *Flindersia xanthoxyla.* Common mid-storey species include Brush Bloodwood, Red Ash, Twin-leaved Coogera and Guioa. Swamp Water Fern *Telmatoblechnum indicum* is common in the ground layer.

An initial Site Action Plan was produced for the northern section of this reserve *Wollongbar Drainage Reserve Restoration Plan* (Moffatt 2001) and the *High Conservation Value Vegetation Restoration Action Plan*: *Wollongbar Rainforest Reserve* (EnviTE 2005) intended for the main rainforest and riparian zone. Both plans concentrated on weed control and planting native species, with the intent to guide volunteer works on the site by a local Landcare group. The rainforest/riparian zone was subject to initial ecological restoration by qualified bush regenerators in 2006, followed by ongoing work through the Landcare group. Landcare work ceased more than ten years ago, and the site is now very weedy. The far southern end is dominated by Camphor Laurel, and parts of the site contain the invasive species Madeira Vine *Anredera cordifolia* and Urena Burr *Urena lobata* at high densities. Lady-of-the-night *Cestrum nocturnum* is the most prevalent weed on edges and Large-leaved Privet *Ligustrum lucidum* is worst in understorey, with Trad and Broad-leaved Paspalum *Paspalum mandiocanum* patchily dominant in the ground layer. Lantana occurs right up into the canopy in some sections.

Some gully erosion is visible along the small creek running through the centre of the site, which connects to Maguires Creek downstream. This creek had a septic smell (near the southern tarred entranceway) at the time of survey and Council sewer maintenance could be needed. The former creek crossing was washed away in the 2022 Northern Rivers flood event, and needs replacing, along with track upgrading for public safety reasons. A small bike track has been constructed by members of the public in the north-east of this site off Cerreto Circuit and minor earthworks (hand-dug) and felling of saplings is evident.

Plate 10: Southern Dalmatia Drive entrance (left) unappealing and Drawn Court entrance planted with palm trees (right).

Plate 11: Joindre Street entrance (left) is formalised but leads only to a steep overgrown bank and Wonga Way entrance (right) is overgrown and appears as private land.

Plate 12: The main reserve entrance (left) is overgrown and not clearly visible. Rubbish is piled against the reserve on neighbouring lot (right).

Plate 13: The only available creek crossing is unsafe and a tree has fallen on a rotten picnic table and platform.

Plate 14: Large areas of the reserve where canopy cover is absent are overgrown with weeds (left), but parts ofthe reserve contain high conservation value rainforest (right).

Plate 15: Constructed bike tracks off Cerreto Circuit.

Recommendations

This site has been neglected for some time and requires significant investment if public use is to be encouraged. The existing walking track is poorly defined with numerous trip hazards, unsteady rocks and abrupt level changes, as well as overhanging branches and vines. A large fallen tree is blocking the track at one point and requires removal to regain access. Old platforms, bridge, fencing and timber tables are rotting in place and should be removed from the reserve as soon as practical. The bridge across the second-order stream is absent and the creek can only be crossed through difficult rock-hopping.

Creek erosion is evident following flooding in 2022 and part of the steeper banks require stabilisation through planting or engineering solutions.

Designated accesses are available into this reserve from Joindre Street, Drawn Court, Wonga Way, two entrances on Dalmacia Drive, Vain Court, Cerreto Circuit and the road reserve beyond Smith Lane. Many of the accesses are overgrown or apparently incorporated into private lots.

- It is recommended that bushland track and trail specialists be engaged to advise and plan the track and creek crossing for longevity and ease of access. Additionally, the track vegetation requires heavy pruning and defining.
- New reserve infrastructure such as tables, chairs and viewing platforms.
- New bridge crossings should be investigated on the main walking track and between Dalmacia Drive and Cerreto Circuit/ Lyle Park.
- Maintenance is required at all access points to Wollongbar Rainforest Reserve to remove and prune overgrown vegetation. Improved signage and formalized walking tracks are recommended at entrances to avoid informal tracks and trampling.
- The central Dalmacia Drive entrance is overgrown, looks dark and uninviting and signage is not obvious. The primary rainforest reserve signage and educational/ interpretative signage is recommended at the central Dalmatia Drive entrance.
- Significant weed control is required, and the upper open drainage area is recommended to be rock-lined to prevent further erosion and planted with species such as Sandpaper Fig, Water Gum *Tristaniopsis laurina* and Giant Water Gum on edges, with *Lomandra* and water tolerant sedges such as *Juncus usitatus* and *Ficinia nodosa* along the drainage channel.
- Removal of illegally dumped waste as per **Plate 12** and general site clean-up is required.
- Removal / chopping of fallen tree to reinstate track access (location shown in **Figure 20**).

Table 8 – Summary of restoration actions for Site 4

Work Sequence	Dominant Weed Species	Actions	Work Area
Primary Work (Year 1)	Camphor Laurel Murraya Ochna Privet Senna Lantana Coral Berry Urena Burr Cocos Palm	▪ Work systematically and comprehensively through the zone commencing from the upstream end in the north and continue work following this line southwards to complete the zone. ▪ Cut, scrape and paint (CSP) woody weeds such as Lantana, Winter Senna, Camphor Laurel, and other woody weeds. ▪ Lop cut stems to reduce trip hazard or allow access for bush regen team if necessary. ▪ Leave treated Lantana frames and other woody weeds in place to break down gradually. ▪ Smaller plants can be hand pulled. ▪ Drill and inject larger exotic trees such as Camphor Laurel.	5.2ha
	Climbing Asparagus Madeira Vine	▪ Cut Climbing Asparagus and other exotic vines at shoulder height, cut, scrape and paint the base of the plant with herbicide. Scrape and paint Madeira Vine stems. Dense leafy stems can be pulled down or cleared from native shrubs intact and bundled to spray. Small or shallow rooted specimens can be hand pulled. Juvenile Asparagus fern to be spot sprayed.	
	Exotic Grasses Freckle Face Hairy Commelina Trad Crofton Weed Mist Flower Blue Billygoat	▪ Clear exotic grasses and groundcovers around small native plants prior to spray to prevent off-target damage. ▪ Spot spray all exotic grasses, herbs and groundcover weeds (overspray dense areas) throughout the site, working thoroughly and systematically as described in primary work above. Follow up the spot spray every 2 months depending on season and prevailing weather conditions.	
Follow Up (Years 2 & 3)	Regrowth of woody weeds, exotic vines, grasses and groundcovers	▪ Follow up spot spray (approx. 4-6 visits / year) depending on season and prevailing weather conditions. If natural regeneration of wetland groundcovers in the north of Zone 2 does not occur, then consider plantings. ▪ Encourage recruitment of native species by well-timed control of weeds.	5.2ha
Maintenance (Years 4 & 5)	Regrowth of weeds	▪ Follow up spot spray (approx. 2-3 visits / year) depending on season and prevailing weather conditions. ▪ Encourage recruitment of native species by well-timed control of weeds.	5.2ha

8.2.5. Site 5: Wollongbar Drainage Reserve (1.1241 ha)

Figure 21: Site 5.

Site 5 is Community Land with the main purpose as a drainage reserve. Stormwater empties into this site from Rubiton Street and a sewerage pipe runs through the reserve. It is surrounded by houses on three sides and neighbours maintain reserve edges as lawn with a variety of exotic plants. The reserve contains two small first-order drainage lines joining to form a second-order stream at the eastern end of the reserve, which then joins another second order stream to form a third-order creek in the lower part of Site 4, eventually becoming Maguires Creek.

Site 5 is linked to Site 4 by an unformed road reserve, which extends between Ramses Street and Smiths Lane and contains water supply infrastructure. Although not part of either site, the road reserve contains bushland of conservation value. The eastern half is mapped as 'significant urban bushland' under Ballina DCP 2012 and follows the drainage channel.

Plate 16: Much of Site 5 is an open channel amongst grassland requiring maintenance mowing.

Plate 17: The eastern area is higher conservation value.

Plate 18: Neighbours gardens with exotic species occur in the reserve.

Recommendations

- The stormwater channel/ drainage line to maintained to allow free flow of stormwater.
- A 6m machinery access occurs adjacent to 34 Rubiton Street and this is to be maintained to enable continued access to stormwater, sewerage and utilities infrastructure within the reserve.
- Zone 5a (8000m^2) - weed control is required and it is recommended that the reserve boundaries be defined, and neighbours consulted with regard to replacing exotic species with natives. Reserve signage would improve recognition of the site as a public reserve.
- Zone 5b (4250m^2) - Large open areas of grassland/groundcover weeds occur in this area. Revegetation is recommended along the channel banks with species such as Creek Sandpaper Fig, Water Gum *Tristaniopsis laurina* and Giant Water Gum *Syzygium franscissi*, Lomandra and water tolerant sedges such as *Juncus usitatus* and *Ficinia nodosa*. The suggested species can be found in **Table 10**.

Table 9 - Summary of restoration actions for Site 5

Work Sequence	Dominant Weed Species	Actions	Work Area
Primary Work Zone 5a (Year 1)	Cadaghi Cocos Palm Camphor Laurel Norfolk Pine African Tulip Tree Murraya Winter Senna Ochna Castor Oil Others	▪ Work systematically and comprehensively through the zone commencing from the west and. continue work following this line eastwards to complete the zone. ▪ Cut, scrape and paint (CSP) woody weeds such as Lantana, Winter Senna and Murraya. ▪ Lop cut stems to reduce trip hazard or allow access for bush regen team if necessary. ▪ Smaller plants can be hand pulled. ▪ Drill and inject Ochna and larger exotic trees such as Camphor Laurel.	0.8ha
	Ipomoea species Passionflowers	▪ Scrape and paint *Ipomoea* species and pull other exotic vines to be sprayed at shoulder height, cut, scrape and paint the base of the plant with herbicide. Dense leafy stems can be pulled down or cleared from native shrubs intact and bundled to spray. Small or shallow rooted specimens can be hand pulled.	
	Exotic grasses Crofton Weed Blue Billygoat Weed Trad	▪ Clear exotic grasses and groundcovers around small native plants prior to spray to prevent off-target damage. ▪ Spot spray all exotic grasses, herbs and groundcover weeds throughout the zone, working thoroughly and systematically as described in primary work above. Follow up the spot spray every 3 months depending on season and prevailing weather conditions.	
Follow Up (Years 2 & 3)	Regrowth of woody weeds, exotic vines, grasses and groundcovers	▪ Follow up spot spray (approx. 4 visits / year depending on season and prevailing weather conditions). Encourage recruitment of native species by well-timed control of weeds.	0.8ha
Maintenance (Years 4 & 5)	Regrowth of woody weeds, exotic vines, grasses and groundcovers	▪ Follow up spot spray (approx. 2-3 visits / year depending on season and prevailing weather conditions. ▪ Encourage recruitment of native species by well-timed control of weeds.	0.8ha

Table 10 - Suggested species for planting in Zone 5b

Scientific Name	Common Name
Species that can withstand inundation and drying in drainage line	
Alocasia brisbanensis	Cunjevoi
Crinum pedunculata	River Lily
Ficinia nodosa	Knobby Club Rush
Fimbristylis dichotoma	Common Fringe-sedge
Juncus usitatus	Common Rush
Lomandra hystrix	Mat Rush
Lomandra longifolia	Spiny-Headed Mat-rush
Machaerina rubiginosa	Twig Rush
Paspalum distichum	Water Couch
Persicaria decipiens	Slender Knotweed
Persicaria hydropiper	Water Pepper
Riparian rainforest species for edge of stream	
Archontophoenix cunninghamiana	Bangalow Palm
Castenospermum australe	Blackbean
Cyperus tetraphyllus	Rainforest Sedge
Ficus coronata	Creek Sandpaper Fig
Elaeocarpus grandis	Blue Quandong
Syzygium francissi	Giant Water Gum

8.2.6. Site 6: Rubiton Park (2426m²)

Figure 22. Site 6.

Site 6 is next to a sports field known as Hill Park Oval, primarily used for cricket, with some children's play equipment and a toilet block adjacent. The area for consideration is a patch of planted vegetation containing local native species, non-local natives, exotic species and fruit trees (Zone 6a), as well as a small open drainage line running to a stormwater outlet on Rubiton Street (Zone 6b). The lot includes a 5m wide unformed pathway running behind houses fronting Bertram Street and Wollongbar Drive to the west, and Rubiton St and Rancher Court to the east, providing an easy accessway to the park for nearby residents.

Native species include Water Gum, Black Bean, Maidens Blush, Rosewood, Blue Quandong, White Booyong, Native Tamarind, Brushbox, Blue Lilly Pilly, Cunjevoi and Sweet Pittosporum. Exotic species include Mango, Avocado, a large Camphor Laurel, African Tulip Tree, Golden Rain Tree, Travellers Palm, Sequoia, Murraya, Grass Tree, Dracaena, Crucifix Orchid, Clivea, Lady-of-the-Night and Trad - the latter covering the ground over a third of the site.

The patch of bushland provides welcome shade and a quiet place to sit, with a small unformed path meandering through. Existing seating is old and apparently little used.


Plate 19: The planted bushland section (left) and the playground (right).


Plate 20: Drainage channels are eroding and require protection and edge plantings.

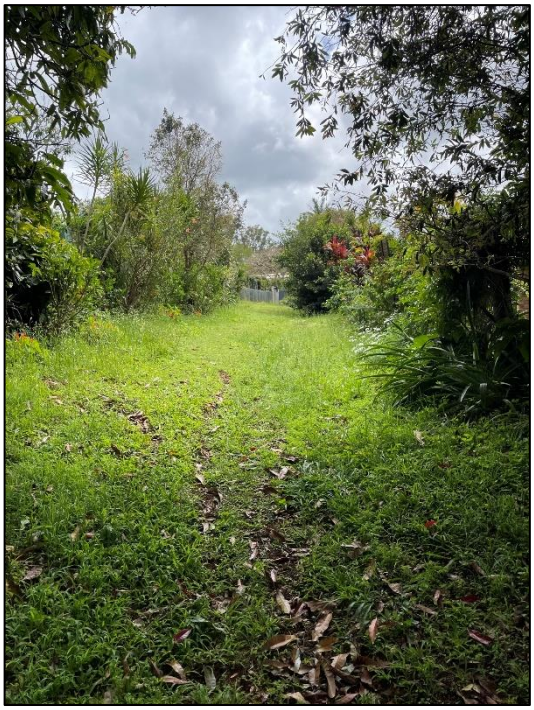


Plate 21: The extension of the park as an access lane behind houses (left) and weed encroachment (right).

Recommendations

- Since the site is primarily an urban park, it is recommended that existing trees remain and weed control in Zone 6a be limited to invasive species only – such as Golden Rain Tree and Trad.
- Additional revegetation could be undertaken on parts of the adjacent open mown areas and around the playground to increase shade while still enabling overlooking from the adjacent street and oval for safety reasons.
- The drainage line (Zone 6b) is eroding and could be rock lined to prevent sediment export to the stormwater drain and thence the local creek, ideally with edges planted with sedges/ Lomandra.
- Opportunities exist for updated seating and picnic tables, with the existing requiring removal due to some rot.

Table 11 - Summary of restoration actions for Site 6

Work Sequence	Dominant Weed Species	Actions	Work Area
Primary Work Zone 6a (Year 1)	Golden Rain Tree African Tulip Tree Camphor Laurel	▪ Work systematically and comprehensively through the zone. ▪ Cut, scrape and paint (CSP) woody weeds. ▪ Lop cut stems to reduce trip hazard or allow access for bush regen team if necessary. ▪ Smaller plants can be hand pulled. ▪ Drill and inject larger exotic invasive species.	0.3ha
	Exotic Grasses Trad	▪ Clear exotic grasses and groundcovers around small native plants prior to spray to prevent off-target damage. ▪ Spot spray invasive grasses, herbs and groundcover weeds throughout the zone, working thoroughly and systematically as described in primary work above. Follow up the spot spray every 3 months depending on season and prevailing weather conditions.	
Follow Up (Years 2 & 3)	Regrowth of woody weeds, exotic vines, grasses and groundcovers	▪ Follow up spot spray (approx. 4 visits / year depending on season and prevailing weather conditions). Encourage recruitment of native species by well-timed control of weeds.	0.3ha
Maintenance (Years 4 & 5)	Regrowth of woody weeds, exotic vines, grasses and groundcovers	▪ Follow up spot spray (approx. 2-3 visits / year depending on season and prevailing weather conditions. ▪ Encourage recruitment of native species by well-timed control of weeds.	0.3ha

8.2.7. Site 7: Cerreto Circuit Reserve (853m^2)

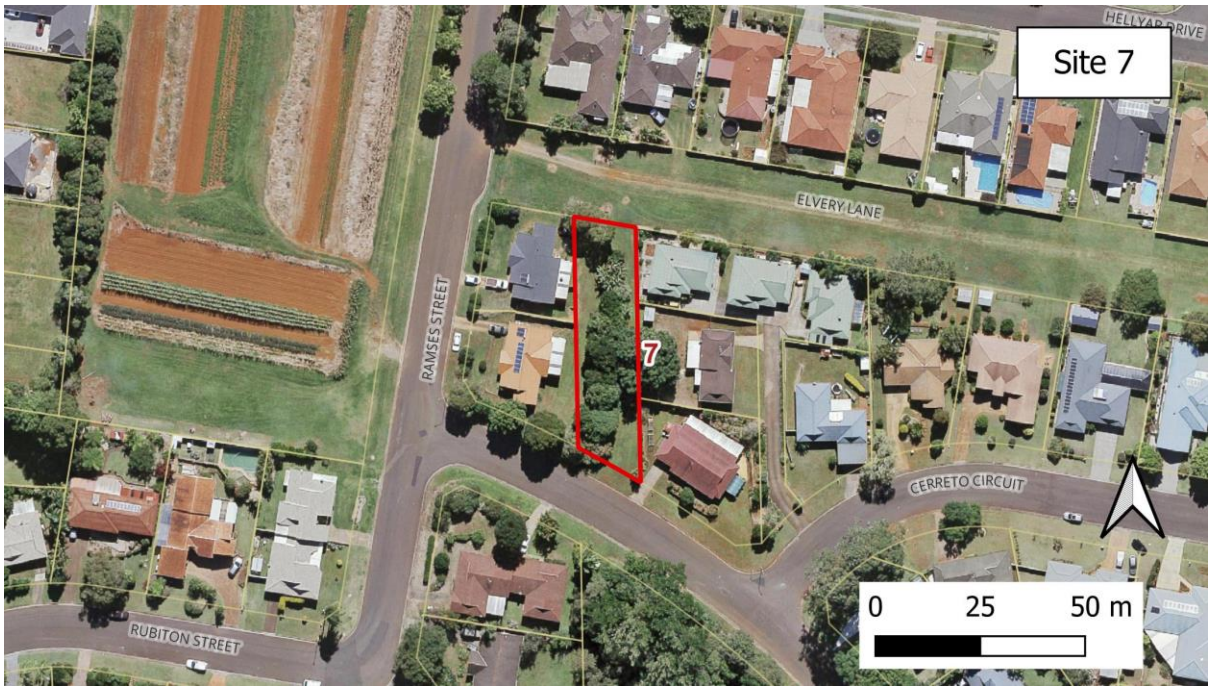

Figure 23. Site 7.

Site 7 is a small reserve connecting Cerreto Court with Elvery Lane. This reserve is approximately 15m wide x 60m long and it is fringed by two houses to the west and three houses to the east. The linear reserve provides a pedestrian walkway connection between Cerreto Court and Elvery Lane. From the streets, it looks like private land (without signage) and neighbours have planted exotic species as a visual barrier to opposite backyards, possibly with some minor building /fencing encroachments. Planted species include Hibiscus, Murraya, Brunfelsia, Bananas, Travellers Palm, Crepe Myrtle, Duranta, Poinciana and Magnolia. Occasional native species include Callistemon, a Silky Oak and a Lilly Pilly. Invasive weeds include Golden Rain Tree, Lady-of-the-Night, Large-leaved Privet and Trad. A vegetable garden and swing set are present within the reserve.

A narrow strip some 4m wide is available as a through route of mown grassland or bare dirt (apparently mown by neighbours as an extension of their backyards), with the remainder crowded with overgrown vegetation and adjacent unkempt rear fences.

Recommendations

- It is recommended the walkway be formalised, reserve signage provided, and discussions held with neighbours regarding removal of exotic species and private recreation/gardens/fences from the reserve.
- Revegetation with local native species is possible but methods to avoid increasing bushfire risk to adjoining properties would have to be considered, such as spaced or clumped trees.

Plate 23: The narrow walkway is unformed and overgrown.

Plate 24: The park contains public infrastructure and is overgrown and encroached on by private backyards (right).

Plate 25: Planted hedgerows divide the park and create unusable area.

Plate 26: Park view from Cerreto Circuit.

8.2.8. Site 8: Lyle Park (1.4984ha)

Figure 24. Site 8.

Lyle Park is the home of the Wollongbar/Alstonville Rugby Club and contains a large oval with goal posts, open and closed stadium bench seating, and a clubhouse with amenities. Site 8 refers to the outer edges of the playing field area and includes a second-order stream and stream banks along the southern, western and northern edges. Erosion and siltation are significant along the reserve edges, arising from unlined stormwater channels (Zone 8b) and an unvegetated part of the steep creek bank (Zone 8c) and impacting the creek. Some recent Lantana control is evident in the southwest.

Overall, the site contains few natives and many weeds. Regenerated native tree species in zone 8a include Sally Wattle, Forest Oak, Red Ash, White Booyong, Sandpaper Fig, Guioa, Bleeding Heart and Pink Euodia. Understorey species include Soft Bracken, Common Rush, Cunjevoi, and Slender Knotweed. Weed species include Blue Billygoat Weed, Alexander Palm, Cobbler's Pegs, Cecropia, Lady-of-the-night, Camphor Laurel, Duranta, Golden Cane Palm, Lantana, Large-leaved Privet, Murraya, Cocos Palm, Slash Pine, Fishbone Fern, Broad-leaved Paspalum, Philodendron, Arrowhead Vine, Castor Oil and Singapore Daisy. Exotic palm trees and planted Jacarandas (Zone 8d) along the eastern field boundary provide a colourful shade corridor.

Plate 27: The SW corner is dominated by Singapore Daisy (left) and the southern bank to be expanded by planting (8c).

Plate 28: Looking down into the weedy creek from the southern edge of the oval (left) and bank erosion (right).

Plate 29: The western drainage line and swale area (8b).

Plate 30: The stormwater channel from Elvery Lane requires rock lining (left) and the northern bank area (right).

Recommendations

- Engage a surveyor to confirm the southern boundary of the site.
- Significant weed control is required in Zone 8a here to remove mature Camphor Laurel, Privet, Lantana, Tobacco Bush, Singapore Daisy and Arrowhead Vine. Work systematically and comprehensively through the zone commencing from the southwest corner and continue work following this line east and then north and west to complete Site 8. Retain Jacarandas in 8d for shade and amenity, and remove the exotic palms in this area.
- Stabilise the open sections of the southern bank down to the drainage line with Spiny-headed Mat-rush and riparian rainforest species such as Sandpaper Fig, Giant Water Gum and Black Bean. Plant a 10m strip at the top of the bank (Zone 8c) using rainforest species from **Table 15** including occasional large trees such as Blue Quandongs for shade. Revegetate the eastern boundary of the reserve between the drainage line and the Jacaranda trees to include further colourful flowering and fruiting rainforest species such as Flame Tree, Native Frangipani, Glossy Laurel, White Laceflower, Bleeding Heart and Tulipwood. Space plants to enable continued pedestrian access along the drainage line. Plant in-stream and edge of channel with species that can withstand inundation and drying, such as Common Rush *Juncus usitatus*, Knobby Club Rush *Ficinia nodosa,* Twig Rush *Machaerina rubiginosa,* Common Fringe-sedge *Fimbristylis dichotoma,* River Lily *Crinum pedunculata* and Mat Rush *Lomandra hystrix.*
- Maintain the eastern drainage line through de-silting in the north. Rock line the drainage channel below the large stormwater pipe outlet in the north adjacent Elvery Lane to slow flow and capture sediment (northern section of Zone 8b). Plant the northern hill with rainforest trees spaced or clumped to provide shade for sitting on the bank.

Table 12 - Summary of restoration actions for Site 8

Work Sequence	Dominant Weed Species	Actions	Work Area
Primary Work Zone 8a (Year 1)	Alexander Palm Slash Pine Duranta Murraya Castor Oil Camphor Laurel Lantana	▪ Work systematically and comprehensively through the zone. ▪ Cut, scrape and paint (CSP) weeds such as Alexander Palm, Castor Oil and Murraya. ▪ Lop cut stems to reduce trip hazard or allow access for bush regeneration team if necessary. ▪ Smaller plants can be hand pulled. ▪ Drill and inject larger exotic trees such as Camphor Laurel Duranta.	0.8ha
	Exotic grasses Singapore Daisy	▪ Clear exotic grasses and groundcovers around small native plants prior to spray to prevent off-target damage. ▪ Spot spray all exotic grasses, herbs and groundcover weeds throughout the zone, working thoroughly and systematically as described in primary work above. Follow up the spot spray every 3 months depending on season and prevailing weather conditions.	
Primary Work Zone 8d (Year 1)	Exotic palms	▪ Cut and paint palm trees and retain Jacarandas for visual amenity.	0.1ha
Follow Up (Years 2 & 3)	Regrowth of woody weeds, exotic vines, grasses and groundcovers	▪ Follow up spot spray (approx. 4 visits / year depending on season and prevailing weather conditions). Encourage recruitment of native species by well-timed control of weeds.	0.9ha
Maintenance (Years 4 & 5)	Regrowth of woody weeds, exotic vines, grasses and groundcovers	▪ Follow up spot spray (approx. 2-3 visits / year depending on season and prevailing weather conditions. ▪ Encourage recruitment of native species by well-timed control of weeds.	0.9ha

8.2.9. Site 9: Wollongbar Sports Fields (5.3446ha)

Figure 25: Site 9.

Wollongbar Sports Fields provides the grounds for the Wollongbar Warriors Football Club, six tennis courts and four basketball courts available for public use, amenities and public carparking. It is presently the site of temporary housing to assist victims of the February/March 2022 floods. Site 9 represents a 30-80m densely vegetated buffer surrounding the sports field and tennis courts and is the subject of a previous plan entitled *Planting and Maintenance Plan for the Biological Buffer: Wollongbar Sports Field* (EnviTE 2011).

Buffer planting was undertaken in summer of 2015/2016 using subtropical rainforest species (see species list in **Appendix 1**) The plantings are doing well, have achieved a low canopy cover at approximately 8m height and consist of appropriate local native species (apart from Fine-leaved Tuckeroo which naturally occurs only within Tweed Shire and further north). Minimal weeds are present within the planting, with weeds are present only on edges and in canopy gaps, however, occasional occurrences of Madeira Vine, Moth Vine Climbing Nightshade, Large-leaved Privet, Corky Passionfruit and White Passionflower should be controlled to avoid future invasion. The site is now reaching a self-sustaining stage as natural regeneration of many species was evident at the time of survey.

Recommendations

The vegetated buffer requires a spray run as soon as practical to reduce weeds on edges and in gaps. A regular schedule for weed control is recommended at least annually to ensure further progression to a fully functioning rainforest.

Plate 31: View of the buffer plantings adjacent the sports field

Plate 32: Weeds occur on edges and in canopy gaps.

Plate 33: A few trees removed for the new carpark have been replaced recently (left) and the bank adjacent the tennis courts (right).

Plate 34: A large Moreton Bay Fig tree is a feature of this site.

8.2.10. Site 10: Elvery Lane Road Reserve southern side (1692m^2)

Figure 26. Site 10.

Site 10 is an elongated section of planted road reserve including a mature Moreton Bay Fig. It occurs north of a private Macadamia plantation and it is a section of road reserve to the immediate east of the Wollongbar sports field buffer area. It has been planted adjacent a mature Moreton Bay Fig with native species including Bleeding Heart, Mat Rush, Prickly-leaved Paperbark, Brown Kurrajong and a Bottle Brush cultivar, and is generally in good condition. Weeds are primarily annuals and occur on edges and where planting have failed. They include Blue Billygoat Weed, Cobbler's Pegs, Paddy's Lucerne and Broad-leaved Paspalum, with occasional Large-leaved Privet, Corky Passionfruit, Tobacco Bush and Climbing Nightshade.

Plate 35: Some bare patches occur around Lomandras, apparently eroded during flood rain (left), and stormwater channel (right).

Recommendations

- The site requires weed control and is best scheduled along with Site 9.
- Minor additional planting required to replace lost plants, with the species suggested in **Table 15**.
- Stormwater infrastructure as a concrete channel runs along the southern side of Elvery Lane and must be protected and maintained.

8.2.11. Site 11: Western Reserve Wollongbar Residential Estate (Kurrabri) (3.1227ha)

Figure 27: Site 11.

The reserve runs between Plateau Drive and Bolwarra Circuit/Riberry Grove, with pedestrian and vehicular access available from Queens Park Court in the south to Bolwarra Circuit in the north as a 4m wide well-formed concrete/ bitumen drive with a culvert crossing over the drainage line. A children's playground is included within the reserve off Bolwarra Circuit. A formed walking path in the north of the reserve links Plateau Drive with Bolwarra Circuit, near a bus stop on Plateau Drive. Stormwater infrastructure from Plateau Drive empties into the reserve and a sewer pipe runs through part of the site in the southeast.

Site 11 is part of the area covered by the *Bushland Rehabilitation and Management Plan for 7(d) zoned land - Wollongbar Urban Expansion Area* (Aspect North 2005) prior to residential development in the northwest of the current Wollongbar suburb extent. This plan was amended by Land Partners in 2010. A new *Rehabilitation Action Plan Wollongbar Park Residential Estate* was prepared by Land and Fire Assessment in 2015 and required planting and weed control to be undertaken by the developer until handover to Council. Not all the actions required by this plan have been achieved to date. This area has now been handed over with extra works undertaken but will require ongoing maintenance. This site has been subject to assisted regeneration and in-fill planting over a five-year period.

Site 11 follows two second-order streams forming the headwaters of Willowbank Creek and is linked to two drainage reserves upstream. It contains regrowth riparian rainforest vegetation as well as rainforest plantings from 2015-16, now largely established (Zone 11a). The plant community here is regrowth and planted rainforest, regarded as the Endangered Ecological Community Lowland Rainforest. Weeds are now encroaching on the creek area and additional primary and maintenance weed control is required. Camphor Laurel and Taro are present. The northern section of the reserve is open mown grassland (Zone 11b) which would be more easily maintained by planting out, with the exception of the drainage infrastructure.

Recommendations

- Analysis of the management plans for the site indicates that the restoration goal – to achieve 80% native vegetation canopy cover and control of all noxious and environmental weeds – has not yet been achieved. Specific areas of concern are:
    - Weeds formerly regarded as 'noxious and environmental' (now classified as weeds requiring Prevention, Eradication, Containment or Asset Protection under the *NSW Biosecurity Act 2015,* with individual weed categories listed in the *North Coast Regional Strategic Weed Management Plan 2023-2027*) are Camphor Laurel (including mature trees that have not been stem-injected), mature Slash Pines (potentially these occur on private land as the boundary is unclear), Broad-leaved Privet, Cocos Palm, Lady of the Night, Corky Passionfruit and White Passionflower.
    - Additional known environmental weeds in local bushland areas include Broad-leaved Paspalum and Taro (*Colocasia esculenta)* occurring within the creek. Taro requires treatment through spraying or hand pulling to avoid choking the drainage line. A large part of the low drainage area is covered by Broad-leaved Paspalum – this should be planted out with native sedges/ rushes and riparian species as slasher access appears unavailable.
    - A number of the semi-mature palms present are Alexander Palms rather than the local native Bangalow Palm.
- Zone 11a is to be subject of assisted regeneration, while zone 11b could potentially be planted out with rainforest species from **Table 15**, with the exception of the drainage infrastructure.
- Barbwire is present across the creek near the culvert. This should be removed for public safety reasons.
- Reserve signage is required at the Queens Park Court entrance to signify public access to the reserve.

Plate 36: The upper drainage line consists of Broad-leaved Paspalum and other weed species. Access is limited or unavailable for slashing. The zone should be planted with native sedges and rushes and riparian edge plants.


Plate 42: Bolwarra Circuit entrance (left) and playground with the reserve in the background (right).


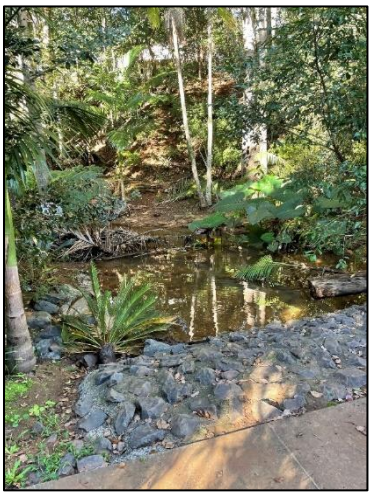

Plate 43: The creek line needs a spray run for weed control and barb-wire fence removed.

Table 13. Summary of restoration actions for Site 11

Work Sequence	Dominant Weed Species	Actions	Work Area
Primary Work Zone 11a (Year 1)	Lantana Privet Lady-of-the-Night	▪ Work systematically and comprehensively through the zone. ▪ Cut, scrape and paint (CSP) weeds such as Lady-of-the-Night and Lantana. ▪ Lop cut stems to reduce trip hazard or allow access for bush regeneration team if necessary. ▪ Smaller plants can be hand pulled. ▪ Drill and inject larger exotic trees.	2.4ha
	Exotic grasses Singapore Daisy	▪ Clear exotic grasses and groundcovers around small native plants prior to spray to prevent off-target damage. ▪ Spot spray all exotic grasses, herbs and groundcover weeds throughout the zone, working thoroughly and systematically as described in primary work above. Follow up the spot spray every 3 months depending on season and prevailing weather conditions.	
	Taro	▪ Spray or hand pull and bag Taro plants along the creek line.	0.2ha
Follow Up (Years 2 & 3)	Regrowth of woody weeds, exotic vines, grasses and groundcovers	▪ Follow up spot spray (approx. 4 visits / year depending on season and prevailing weather conditions). Encourage recruitment of native species by well-timed control of weeds.	2.4ha
Maintenance (Years 4 & 5)	Regrowth of woody weeds, exotic vines, grasses and groundcovers	▪ Follow up spot spray (approx. 2-3 visits / year depending on season and prevailing weather conditions. ▪ Encourage recruitment of native species by well-timed control of weeds.	2.4ha

8.2.12. Site 12: North Reserve Wollongbar Residential Estate (Mt Moriah) (1.4045ha)

Figure 28: Site 12.

Site 12 is a drainage reserve containing the headwaters of Willowbank Creek, to the west and south of Spring Creek Place. It includes adjoining vegetated riparian land and cleared open space and stormwater infrastructure, developed as part of the Mount Moriah residential estate. Vehicular access is available from Spring Creek Place

off Plateau Drive, with pedestrian access available from Callicoma Court. The reserve has been subject to assisted regeneration and infill planting works in Zone 12a by the developer of Mount Moriah estate, and open space is managed as sloping mown grassland.

The site is part of the area covered by previous plans including:

- *Bushland Rehabilitation and Management Plan for 7(d) zoned land - Wollongbar Urban Expansion Area*, written in 2005 (Aspect North, amended by Land Partners in 2010).
- *Vegetation Management Plan Mt Moriah Residential Development* produced by Ardill Payne & Associates in 2012 includes the lower part of the reserve off Spring Creek Place. This plan required a constructed concrete access path which has not been built, although the grassed area is hardened and driveable. Camphor Laurel is still present in parts and the creek area is covered in annual weeds and Broad-leaved Paspalum, possibly indicating previous sedimentation.
- *Rehabilitation Action Plan Wollongbar Park Residential Estate* prepared by Land and Fire Assessment in 2015 includes the upper section of the drainage line below Callicoma Court, which required 80% native vegetation canopy cover and all noxious and environmental weeds controlled. This has largely been achieved in this upper section, though the site requires follow-up weed control.

Recommendations

- The site needs further weeding in Zone 12a to control semi-mature Camphor Laurel, Cadaghi, Cocos Palm, Privet, Passionfruit, Singapore Daisy and Setaria on the creek edge; and Taro, Broad-leaved Paspalum and annual weeds in the creek bed.
- Reserve edges are undefined adjacent houses and some exotic garden species could be on the edge of neighbouring properties.
- No concrete access pathway has been provided as originally planned within the Mount Moriah VMP.
- Expand riparian edges over the steepest grassed area to reduce mowing (Zone 12b). Plant Giant Water Gum on low grass area that remains unplanted.

Plate 44: Overview of drainage reserve taken from Callicoma Court (left) and creek bed overgrown with weeds (right).

Plate 45: Looking northwest from Spring Creek Place (left) and grassed accessway adjacent creek (right).

Plate 46: Camphor Laurel remains untreated in parts (left) & electricity infrastructure at the upper end of the reserve.

Table 14. Summary of restoration actions for Site 12

Work Sequence	Dominant Weed Species	Actions	Work Area
Primary Work Zone 12a (Year 1)	Lantana Privet Lady-of-the-Night Camphor Laurel Cocos Palm Tobacco Bush Cadaghi	▪ Work systematically and comprehensively through the zone. ▪ Cut, scrape and paint (CSP) weeds such as Lady-of-the-night and Lantana. ▪ Lop cut stems to reduce trip hazard or allow access for bush regeneration team if necessary. ▪ Smaller plants can be hand pulled. ▪ Drill and inject larger exotic trees.	1ha
	Exotic grasses Singapore Daisy	▪ Clear exotic grasses and groundcovers around small native plants prior to spray to prevent off-target damage. ▪ Spot spray all exotic grasses, herbs and groundcover weeds throughout the zone, working thoroughly and systematically as described in primary work above. Follow up the spot spray every 3 months depending on season and prevailing weather conditions.	
	Taro	▪ Spray or hand pull and bag Taro plants along the creek line.	0.2ha
Follow Up (Years 2 & 3)	Regrowth of woody weeds, exotic vines, grasses and groundcovers	▪ Follow up spot spray (approx. 4 visits / year depending on season and prevailing weather conditions). Encourage recruitment of native species by well-timed control of weeds.	1ha
Maintenance (Years 4 & 5)	Regrowth of woody weeds, exotic vines, grasses and groundcovers	▪ Follow up spot spray (approx. 2-3 visits / year depending on season and prevailing weather conditions. ▪ Encourage recruitment of native species by well-timed control of weeds.	1ha

8.2.13. Site 13: Eastern Reserve Wollongbar Residential Estate (0.3649ha)

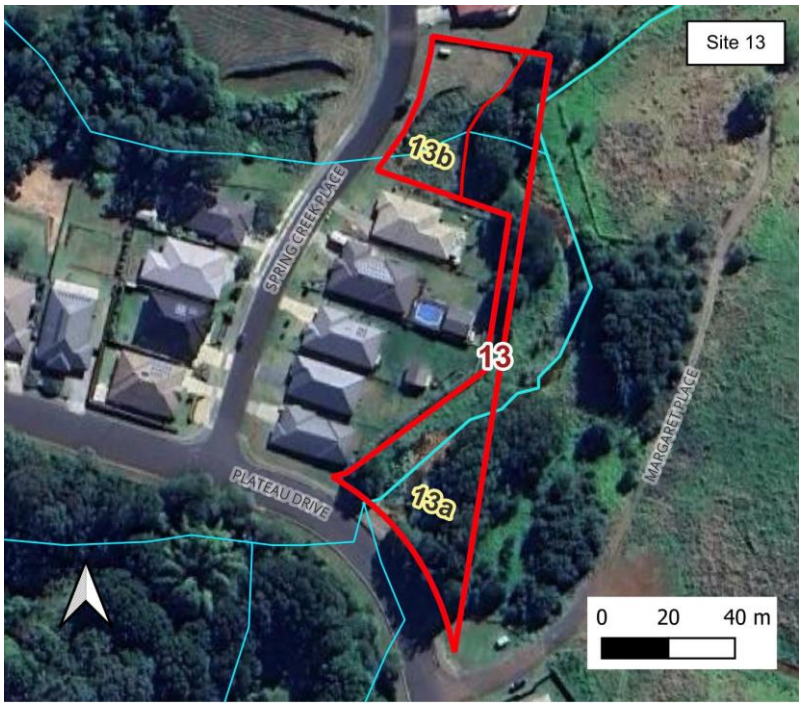

Figure 29: Site 13.

Site 13 is a drainage reserve including the lower portion of Willowbank Creek to the east of Spring Creek Place and downstream of Site 12. It consists of a section of land adjacent Spring Creek Place and another section adjoining Plateau Drive, connected by a narrow 3m wide strip behind numbers 2 to 10 Spring Creek Place. This site has been subject to assisted regeneration over a five-year period. Taro occurs in this site.

The site is part of the area covered by previous plans including:

- *Bushland Rehabilitation and Management Plan for 7(d) zoned land - Wollongbar Urban Expansion Area*, written in 2005 (Aspect North, amended by Land Partners in 2010).
- The initial portion adjacent Spring Creek Place (zone 13b and part of zone 13a) is contained within the *Vegetation Management Plan Mt Moriah Residential Development* produced by Ardill Payne & Associates in 2012. Zone 13b required infill planting on a 3mx3m grid and zone 13a, assisted regeneration. This work does not appear to have been completed.
- Zone 13a is infested with Singapore Daisy, Taro along the riparian section and Golden Raintree, Lantana, Camphor Laurel and Broad-leaved Privet and other woody weeds through the vegetated area.

Recommendations

- Maintain drainage line and access to stormwater infrastructure.
- Zone 13b requires planting of native species from **Table 15**.
- Assisted regeneration is required in Zone 13b, as by the Mount Moriah VMP.
- The southern part of Zone 13a adjoining Plateau Drive requires significant weed control.

Plate 47: View from Plateau Drive looking upstream (left) and looking downstream from Spring Creek Place (right).

Plate 48: Dense Singapore Daisy infestation (left) and Taro and Golden Rain Tree near Plateau Drive.

7.4.14. Site 14: South Eastern Reserve Wollongbar Residential Estate (0.1306ha)

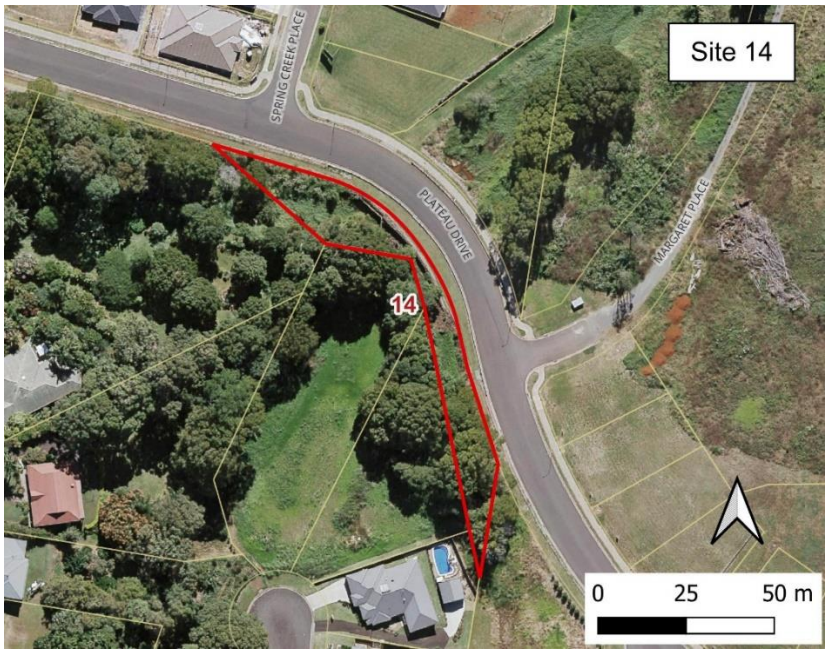

Figure 30: Site 14.

Site 14 is a narrow riparian strip of vegetation along the south side of Plateau Drive. It is heavily weed infested and does not appear to have been worked previously. Native species are limited to common regrowth edge species such as Guioa, Sally Wattle and Macaranga. Exotic vegetation dominates with Camphor Laurel in the canopy, Singapore Daisy in the ground layer and Privet, Lantana, Passionfruits and Setaria in the midstorey.

This site was included as part of Zone 8 within the *Bushland Rehabilitation and Management Plan for Wollongbar Urban Expansion Area 2005* which required primary weed treatment and enhancement planting. The site has been subject to assisted regeneration over a five-year period.

Recommendations

- Maintain drainage line and access to stormwater infrastructure.
- Significant weed control required.

Plate 49: Site 14 is heavily weed infested.

Plate 50: The site is adjacent Plateau Drive.

7.4.15. Site 15: Wollongbar District Park (0.1548ha)

Figure 31: Site 15.

Site 15 consists of garden beds planted with native rainforest species in 2022 to form vegetation buffers in the western and eastern corners of Wollongbar District Park. The park contains the Wollongbar Alstonville Skate Park as well as a half basketball court, children's playground, toilet facilities, walking paths, picnic shelters and bar-be-que facilities. The garden beds are contained within garden edging and well mulched, with no weeds present at the time of inspection, and several of the tree species are labelled with ground level plaques.

The western bed occurs at the corner of Plateau Drive and Avalon Avenue, while the eastern bed is located between Rifle Range Road and Dundee Avenue. The site is within the area encompassed by the *Bushland Rehabilitation and Management Plan for Wollongbar Urban Expansion Area 2005.*


Plate 51: The western planted vegetation buffer (15a).


Plate 52: The planted vegetation buffer eastern side (15b).


Plate 53: Park and playground facilities.

8.3 Proposed Planting List – Subtropical Rainforest

Plant selection is to be guided by the occurrence of species in the adjacent remnants or those that are included in Subtropical Rainforest on basalt soils and have successfully established in the previous plantings. The density of planting is to range from 1.5 to 3m or in clumps, depending on the location.

Prior to planting, ensure that the Work Zone has been prepared by controlling weeds so that they do not inhibit the establishing plants once planted. Preparation can be the control of all weeds, generally mown grass, or sprayed circles of approximately 1m diameter.

Holes to be dug using a motorised auger, ensuring that hole is deeper and wider than the plant container. Holes to be dug on the day of planting so that the soil has not dried out. Prior to planting soak the plants in water with added seaweed fertiliser. Slow-release fertiliser suitable for native plants to be added and mixed with the soil to assist in plant establishment. Water is to be added to the hole before and after planting. The amount of water will depend on the soil moisture. Mulch to be placed around the plant if soil is bare.

Fencing or guards may be required if planting is likely to be impacted by browsing by wallabies or rabbits. Water and maintenance frequency will depend on weather conditions. The proposed rainforest planting list is contained in **Table 15** below. Additional lists for feature plants in public areas and plants suitable for planting under powerlines is contained in **Table 7**, and for wetland and riparian edge planting (if required) is contained in **Table 10**.

Table 15 - Subtropical Rainforest species suitable for planting if required

Scientific Name	Common Name
Acacia melanoxylon	Sally Wattle
Acmena smithii	Common Lilly-pilly
Alphitonia excelsa	Red Ash
Apananthe phillipensis	Rough-leaved Elm
Archonotophoenix cunninghamiana	Bangalow Palm
Argyrodendron trifoliolatum	White Booyong
Breynia oblongifolia	Breynia
Bridelia exaltata	Brush Ironbark
Castanospermum australe	Black Bean
Commersonia bartramia	Brown Kurrajong
Cryptocarya laevigata	Glossy Laurel
Cryptocarya obovata	Pepperberry
Cupaniopsis anarcardiodes	Tuckeroo
Diploglottis australis	Native Tamarind
Dysoxylum mollissimum	Red Bean
Eleocarpus grandis	Blue Quandong
Glochidion ferdinandi	Cheese Tree
Guioa semiglauca	Guioa
Homalanthus populifolius	Bleeding Heart
Jagera pseudorhus var. *pseudorhus*	Foambark
Mallotus phillippinnensis	Red Kamala
Melicope elleryana	Pink Euodia
Myrsine howittiana	Brush Muttonwood
Neolitsea australiensis	Green Bolly Gum
Olea paniculata	Native Olive
Sarctopteryx stipata	Steelwood
Sloanea woollsii	Yellow Carabeen
Sterculia quadrifida	Peanut Tree
Synoum glandulosum	Scentless Rosewood
Syzygium francissi	Giant Water Gum
Trema tomentosa	Poison Peach

8.4 Schedule of Works

This plan does not specify a particular duration for restoration works. Works may be undertaken by Council, contractors or volunteers such as Landcare members. However, where funds become available for new projects, a five (5) year duration for the weed control program is recommended and described in **Table 16;** comprising primary weed control and planting if required (Year 1), then follow-up weed control (Year 2 & 3) followed by maintenance (Year 4 & 5).

Table 16 – Five (5) year implementation schedule for restoration works

Year	Activity
1	▪ Two (2) monitoring photo-points to be set up within each vegetation management zone and baseline monitoring data recorded prior to commencement of any habitat restoration works. ▪ Primary weed control in all sites. ▪ Planting if required. ▪ Follow up weed control in all sites every 2 months or as required. ▪ Replace any failed plants. ▪ Repeat photo point monitoring at the end of Year 1. ▪ Submit annual progress report with monitoring results to Ballina Shire Council.
2 & 3	▪ Maintenance weed control in all zones (approx. 6 visits/year). ▪ Repeat photo point monitoring at the end of Year 2 & 3. ▪ Submit annual progress report with monitoring results to Ballina Shire Council.
4 & 5	▪ Maintenance weed control in all zones (approx. 3 visits/year). ▪ Repeat photo point monitoring at the end of Year 4 & 5. ▪ Submit final evaluation report with all monitoring results to Ballina Shire Council.

8.5 Weed Control Methods

Weeds must be controlled in such a way that they are replaced by native species. Weed control in this context consists of several stages including (a) primary weed control, (b) follow up weed control, and (c) maintenance of the restoration work sites. The sequence of proposed works is based upon the need to arrest the degradation factors while maximising the regeneration potential in the vegetation management zone. Seasonal weather conditions and the need to systematically follow up weed control are also important considerations. Weed control methods are provided in **Appendix 2.**

9. GENERAL RESTORATION GUIDELINES

9.1 Bush Regenerators

On ground weed control works and maintenance may be undertaken by qualified bush regeneration contractors or staff, or Landcare Volunteers. Contractors working on site should holding TAFE Conservation and Ecosystem Management (CEM) Certificate III and supervisor holding CEM Certificate IV or equivalent, and with minimum 3 years' experience working in local rainforest and wetland/ riparian forest vegetation communities. A qualified bush regenerator will be capable of advising on the extent and timing of works, record keeping, selected locations and appropriate species for planting, and work site maintenance program.

The bush regeneration team must hold an appropriate licence (issued under the *Biodiversity Conservation Act 2016*) to work in the habitat of threatened species and endangered ecological communities prior to commencing on ground weed control works. Ballina Shire Council holds a Scientific Licence which authorises approved bush regeneration contractors and Landcare volunteers to undertake such work.

Hygiene protocol activities are required for working with specific threatened species within restoration sites, moving from identified infected work zones to a sensitive work zone and for off-road trail and track movement, in accordance NSW Government *Hygiene Guidelines for Wildlife*, accessed on the link below:

https://www.environment.nsw.gov.au/research-and-publications/publications-search/hygiene-guidelines

9.2 Pesticide Application

Use of chemicals such as herbicides and their additives must only be carried out by personnel who hold current chemical users' certificates. These chemicals must be used in accordance with label directions unless an off-label use permit is procured from the Australian Pesticides and Veterinary Medicines Authority (APVMA).

Chemical use records must also be kept and include weather conditions, areas treated, amounts used and application rates in accordance with the NSW Pesticides Act 1999.

Bush regenerators working in any Work Zones on public land must comply with Ballina Shire Council's current Pesticide Use Notification Plan and Policy

9.3 Workplace Health and Safety

All works are to adhere to the relevant industry standards, permits, certificates and regulations. In accordance with the Work Health and Safety Act 2011 and Work Health and Safety Regulations 2017 workers will comply to ensure safety in the workplace. Contractors are also required to provide WorkCover for employees or ensure sub-contractors hold individual personal insurance for bush regeneration work.

Contractors and Landcare volunteers approved by Ballina Shire Council need to ensure they have submitted and adhere to an approved current Work Health and Safety System as per Council requirements.

10. MONITORING AND RECORD KEEPING

10.1 Monitoring Requirements

A monitoring program measures Key Performance Indicators (KPIs) designed to gauge, progressively, the success of the program and allow for the early detection of risk factors to achieving the aims and objectives of the restoration project. This provides an opportunity for adaptive management and improves the chances for success of the project.

10.2 Monitoring Methodology

Any new habitat restoration or reconstruction program will be monitored annually using photo points. Two (2) photo points are to be set up within each restoration zone prior to commencement of work. The photo point location should be determined using a GPS, with point coordinates recorded in the work diary or Daily Record Sheet and marked on a map of the site. The compass orientation of each photo should also be noted. The photo points are to be set up as follows:

- Photo point location marked using a star picket with protective cap on the top.
- The marker to be located in the centre of the photo to provide a reference point.
- Photos to be taken in the same direction and time of day each time.
- The camera lens, angle and height to be the same for each photo.

For each photopoint describe the vegetation as follows:

- Species richness for each forest layer (no. of species weeds and native).
- Height and Foliage cover for each forest layer (%).
- Exotic vegetation cover in each layer (%).
- For the planting areas record survival rate and growth rate of plants (5 plants in each planting to be flagged and measured on annual basis)

The photo points are to be repeated on an annual basis for five (5) years and photos included within annual progress reports to Ballina Shire Council.

10.3 Key Performance Indicators

- Primary treatment of all weeds in the work zone to achieve environmental weed cover of less than 10% ground cover and less than 1% shrub and tree layer species at completion of year one (establishment period).
- During years 2-5 (maintenance period) environmental weeds are to be progressively treated to ensure no weeds are present at completion of year five.
- Planting stock to achieve a survival rate of 90%.
- Achievement of 80% closed native canopy cover.
- During the establishment and maintenance period increased recruitment of native species and percentage cover of native species to be achieved.

Monitoring of KPIs and repeat photographs to be undertaken on an annual basis. Adaptive management may be required as a recommendation after monitoring. This adaptive management approach is especially important in relation to the control of weeds and the species selection and survival rates for planting programs. Regular monitoring is to be used to assess the effectiveness of management strategies and provide the basis for adaptation of the implementation schedule.

10.4 Reporting

Any bush regeneration contractor undertaking the weed control or planting works must provide an annual progress report to Ballina Shire Council for the duration of the five (5) year habitat restoration program. The annual report is to include:

- A brief discussion of works completed to date, including an update on the progress of plantings, weed control and assisted natural regeneration works.
- A description of project issues and potential resolution (i.e. adaptive management).
- A self-assessment against the Performance Indicators provided in this plan.
- Repeat photo point monitoring.
- Recommendations for future vegetation management works.
- Copies of Daily Record Sheets.

In addition to progress reports, a final evaluation report is to be prepared at the end of any five-year program. The evaluation report will summarise the monitoring data over the five-year period, discuss findings and provide recommendations for future management of the Work Zone.

10.5 Adaptive Management

A key factor for any project success will be the ability of those implementing the plan to respond to changing Work Zone conditions. The purpose of regular monitoring, recording and reporting is not only to document the progress of the project, but also to respond to unanticipated circumstances, provide feedback on the success or failure of the plan, and allow adaptation of the management actions and implementation measures to achieve maximum effectiveness in vegetation and fauna management.

Where necessary, an adaptive management statement should be prepared and detail the nature of any issues that may threaten the achievement of project objectives as well as appropriate corrective actions, for review and endorsement by Ballina Shire Council.

REFERENCES

Ardill Payne and Partners (2012). Vegetation Management Plan Proposed Residential Development Plateau Drive, Wollongbar. Report to Ballina Shire Council.

Aspect North (2005). Bushland Rehabilitation and Management Plan for 7(d) zoned land Wollongbar Urban Expansion Zone. Report to Ballina Shire Council.

Ballina Shire Council (2016). *Ballina Shire Koala Management Strategy*. Unpublished report prepared by Ballina Shire Council.

Bayley, D. & Brouwer, D. (2004) *Vegetation Survey and Assessment: A practical guide for the management of native vegetation.* Tocal and NSW Agriculture, Australia.

EnviTE (2005). *HCV Vegetation Restoration Action Plan – Wollongbar Rainforest Reserve*. Report to Natural Heritage Trust.

EnviTE (2011). *Planting and Maintenance Plan for the Biological Buffer Wollongbar Sports Field*. Report to Ballina Shire Council.

Isbell RF, National Committee on Soil and Terrain (2021) *The Australian Soil Classification*. 3rd edition. CSIRO Publishing, Melbourne.

Morand, D.T. (1996). *Soil Landscapes of the Lismore-Ballina* 1:100,000 Sheet. Department of Conservation and Land Management, Sydney.

Land and Fire Assessments (2015). Amended Rehabilitation Action Plan for 7(d) Zoned Land – Wollongbar Park Estates. Report to Ballina Shire Council.

Local Land Services (2022*). North Coast Regional Strategic Weed Management Plan 2023-2027* (September 2022). North Coast Local Land Services, NSW State Government.

Moffat, Bob (2001). *Wollongbar Drainage Reserve Restoration Plan*. Report to Ballina Shire Council.

NSW eSPADE (2019) Soil Profile and Mapping Application. Accessed online at http://www.espade.environment.nsw.gov.au. Office of Environment and Heritage, NSW.

NSW National Parks & Wildlife Service (2008) *Threatened Species Management Information Circular No. 6 - Hygiene protocol for the control of disease in frogs*. Department of Environment and Climate Change, NSW.

APPENDIX 1: SPECIES LISTS BY SITE

Species in bold are listed threatened species under the Biodiversity Conservation Act 2016.

Site 1: Native species

Scientific Name	Common Name
Araucaria cunninghamii	Hoop Pine
Blechnum indicum	Harsh Ground Fern
Cupaniopsis anacardioides	Tuckeroo
Dysoxylum fraserianum	Rosewood
Eucalyptus siderophloia	Grey Ironbark
Guioa semiglauca	Guioa
Litsea reticulatis	Bolly Gum
Macadamia integrifolia	Macadamia (planted)
Pittosporum undulatum	Native Daphne

Site 1: Exotic and non-local species

Scientific Name	Common Name
Agapanthus praecox	Agapanthus
Ageratina adenophora	Crofton Weed
Cestrum nocturnum	Lady-of-the-night
Cinnamomum camphora	Camphor Laurel
Corymbia torelliana	Cadaghi (planted)
Corymbia maculata	Spotted Gum (planted)
Cupressus spp.	Conifer (planted)
Guzmania lingulata	Bromeliad
Ipomoea indica	Morning Glory
Lantana camara	Lantana
Ligustrum lucidum	Large-leaved Privet
Metrosideros queenslandica	Metrosideros
Murraya paniculatum	Murraya (planted as hedge)
Paspalum mandiocanum	Broad-leaved Paspalum
Passiflora subpeltata	White Passionflower
Pinus elliotti	Slash Pine
Setaria palmifolia	Palm Grass
Syragrus romanzoffiana	Cocos Palm
Tibouchina urvilleana	Tibouchina
Washingtonia robusta	Fan Palm

Site 2: Native species

Scientific Name	Common Name
Acacia melanoxylon	Sally Wattle
Acmena smithii	Creek Lilly Pilly
Alphitonia excelsa	Red Ash
Commersonia bartramia	Brown Kurrajong
Cupaniopsis anacardioides	Tuckeroo
Ficus obliqua	Small-leaved Fig
Jagera pseudorhus	Foambark
Pittosporum undulatum	Native Daphne

Site 2: Exotic and non-local species

Scientific Name	Common Name
Anredera cordifolia	Madeira Vine
Cinnamomum camphora	Camphor
Corymbia citriodora	Lemon-scented Gum
Duranta erecta	Duranta
Eucalyptus smithii	Ironbark Peppermint
Ficus bejamina	Weeping Fig
Ipomoea indica	Morning Glory
Jacaranda mimosifolia	Jacaranda
Lantana camara	Lantana
Ligustrum lucidum	Large-leaved Privet
Murraya paniculatum	Murraya
Paspalum mandiocanum	Broad-leaved Paspalum
Pennisetum clandestinum	Kikuyu
Senna pendula	Winter Senna
Solanum mauritianium	Tobacco Bush
Schefflera actinophylla	Umbrella Tree

Site 3: Native species

Scientific Name	Common Name
Brachychiton acerifolius	Flame Tree
Cordyline congesta	A Palm-lily
Dianella caerulea	Dianella
Dysoxylum mollissimum	Red Bean
Ficus macrophylla	Moreton Bay Fig
Grevillea robusta	Silky Oak
Guioa semiglauca	Guioa
Lepidozamia peroffskyana	Burrawang (planted)
Syzygium australis	Brush Cherry
Syzygium leuhmannii	Riberry

Site 3: Exotic and non-local species

Scientific Name	Common Name
Araucaria heterophylla	Norfolk Pine
Archontophoenix alexandrae	Alexander Palm
Citrus x sinensis	Orange Tree
Cordyline australis	Cabbage Tree
Corymbia citriodora	Lemon-scented Gum
Dietes grandiflora	African Iris
Doryanthes excelsa	Giant Lily
Dracaena marginata	Dracena
Dracaena sanderiana	Lucky Plant
Dypsis lutescens	Golden Cane
Elaeocarpus eumundi	Eumundi Quandong
Hedychium gardnerianum	Ginger Lily
Howea forsteriana	Kentia Palm
Jacaranda mimosifolia	Jacaranda
Libidibia ferrea	Leopard Tree
Mangifera indica	Mango
Plumeria rubra	Frangipani
Philodendron hederaceum	Philodendron
Rotheca myricoides	Blue Butterfly Bush
Schefflera actinophila	Umbrella Tree
Tradescantia fluminensis	Trad

Site 4: Native species

Scientific Name	Common Name
Acacia melanoxylon	Sally Wattle
Acalypha eremorum	**Acalypha**
Acmena smithii	Creek Lilly Pilly
Actephila lindleyi	Actephila
Alectryon tomentosus	Hairy Alectryon
Alphitonia excelsa	Red Ash
Alpinia caerulea	Native Ginger
Aneilema biflorum	Aneilema
Archidendron muellerianum	Veiny Lace Flower
Archontophoenix cunninghamii	Bangalow Palm
Argyrodendron trifoliolatum	White Booyong
Artera distylis	Twin-leaf Coogera
Asplenium australasicum	Bird´s Nest Fern
Austrocallerya megasperma	Native Wisteria
Austrosteenisia blackii	Blood Vine
Breynia oblongifolia	Breynia
Briedelia exaltata	Brush Ironbark
Calamus muelleri	Lawyer Vine
Capparis arborea	Brush Caperberry
Carronia multisepala	Carronia
Castanospermum australe	Black Bean
Cayratia clematidea	Slender Grape
Celastrus subspicatus	Large-leaved Staff Vine
Cinnamomum virens	Red-barked Sassafras
Cissus antarctica	Water Vine
Citrus australasicus	Finger Lime
Clerodendrum floribundum	Smooth Clerodendrum
Commelina cyanea	Blue Commelina
Commersonia bartramia	Brown Kurrajong
Cordyline petiolaris	Broad-leaved Palm Lily
Cordyline rubra	Red-fruited Palm Lily
Cryptocarya obovata	Pepperberry
Deeringia arborescens	Climbing Deeringia
Derris involuta	Native Derris
Dianella caerulea	Blue Flax Lily
Dichondra repens	Kidney Weed
Dioscorea transvera	Native Yam
Diospyros pentamera	Myrtle Ebony
Diplocyclos palmatus	Native Bryony
Diploglotttis australis	Native Tamarind
Duboisia myoporoides	Duboisia
Dysoxylum fraserianum	Rosewood
Dysoxylum mollissimum	Red Bean
Dysoxylum rufum	Hairy Rosewood

Scientific Name	Common Name
Elaeocarpus grandis	Blue Fig
Elaeocarpus obovatus	Hard Quandong
Elattostachys nervosa	Green Tamarind
Embelia australiana	Embelia
Endiandra pubens	Hairy Walnut
Eupomatia bennettii	Small Bolwarra
Ficus coronata	Creek Sandpaper Fig
Ficus fraseri	Forest Sandpaper Fig
Ficus watkinsiana	Nipple Fig
Flagellaria indica	Whip Vine
Flindersia schottiana	Cudgerie
Flindersia xanthoxyla	Yellow Wood
Geitonoplesium cymosum	Scrambling Lily
Glochidion ferdinandi	Cheese Tree
Guioa semiglauca	Guioa
Hibbertia scandens	Guinea Flower
Hymenosporum flavum	Native Frangipani
Jagera pseudorhus	Foambark
Litsea australis	Brown Bolly Gum
Maclura cochinchinensis	Cockspur
Mallotus discolor	Yellow Kamala
Mallotus philippensis	Red Kamala
Marsdenia rostrata	Common Milk Vine
Morinda jasminoides	Morinda
Neolitsea australiensis	Green Bolly Gum
Neolitsea dealbata	White Bolly Gum
Oplisemnus imbecilis	Basket Grass
Oplismenus aemulus	Basket Grass
Palmeria scandens	Anchor Vine
Pandorea baileyana	Long-leaved Wonga Vine
Pandorea pandorana	Wonga Vine
Pararchidendron pruinosum	Snow Wood
Pararistolochia praevenosa	Richmond Birdwing Butterfly Vine
Parsonsia straminea	Common Silkpod
Pentaceras australis	Bastards Crow's Ash
Pilidiostigma glabrum	Plum Myrtle
Piper noaehollandiae	Giant Pepper Vine
Pittosporum multiflorum	Orange Thorn
Pittosporum revolutum	Hairy Pittosporum
Pittosporum undulatum	Sweet Pittosporum
Platycerium bifurcatum	Elkhorn
Platycerium superbum	Staghorn
Plectranthus graveolens	Plectranthus
Pollia crispata	Pollia
Pothos longipes	Pothos
Pseuderanthemum variabile	Pastel Flower

Scientific Name	Common Name
Quassia sp. *Mt Nardi*	Southern Quassia
Rhodamnia rubescens	**Scrub Turpentine**
Rhodamnia maideniana	**Smooth Scrub Turpentine**
Ripogonum album	White Supplejack
Ripogonum discolor	Prickly Supplejack
Rubus rosifolius	Native Raspberry
Sarcomelicope simplicifolia	Bauerella
Sarcopteryx stipata	Steelwood
Sloanea australis	Maiden's Blush
Smilax australis	Native Sarsparilla
Stephania japonica var. *discolor*	Snake Vine
Synoum glandulosum	Scentless Rosewood
Syzygium austral	Brush Cherry
Syzygium oleosum	Blue Lilly Pilly
Tabernaemontana pandacaqui	Banana Bush
Tinospora tinosporoides	**Arrowhead Vine**
Toechima dasyrrhache	Blunt-leaved Steelwood
Toona ciliata	Red Cedar
Trophis scandens	Burny Vine
Viola hederacea	Native Violet
Wilkiea huegeliana	Veiny Wilkiea
Wilkiea macrophylla	Large-leaved Wilkiea

Site 4: Planted native species

Scientific Name	Common Name
Acmena smithii	Creek Lily Pilly
Agathis robusta	Kauri Pine
Alectryon tomentosus	Hairy Alectryon
Araucaria cunninghamii	Hoop Pine
Archontophoenix cunninghamiana	Bangalow Palm
Arytera distylis	Twin-leaved Coogera
Austromyrtus lasioclada	Velvet Myrtle
Brachychiton acerifolium	Illawarra Flame-Tree
Castanospermum australe	Black Bean
Cinnamomum virens	Red Barked Sassafras
Commersonia bartramia	Brown Kurrajong
Cordyline petiolaris	Broad-leaved Palm Lily
Cordyline rubra	Red-fruited Palm Lily
Cryptocarya glaucescens	Jackwood
Cryptocarya obovata	Pepperberry
Cryptocarya rigida	Velvet Laurel
Diploglottis australis	Native Tamarind
Diploglottis campbellii	Small-leaved Tamarind
Dysoxylum fraserianum	Rosewood
Dysoxylum mollissimum	Red Bean

Scientific Name	Common Name
Euroschinus falcata	Ribbon Wood
Ficus coronata	Creek Sandpaper Fig
Ficus fraseri	Forest Sandpaper Fig
Ficus macrophylla	Moreton Bay Fig
Flindersia australis	Australian Teak
Flindersia schottiana	Cudgerie
Flindersia xanthoxyla	Yellow Wood
Glochidion ferdinandi	Cheese Tree
Guioa semiglauca	Guioa
Harpullia pendula	Tulip Wood
Herietiera trifoliolata	White Booyong
Hymenospermum flavum	Native Fragipani
Jagera pseudorhus	Foam Bark
Lomandra hystrix	Mat Rush
Lomandra longifolia	Spiny-headed Mat-rush
Macadamia tetraphylla	Rough-shelled Bush Nut
Macaranga tanarius	Macaranga
Mallotus discolor	Yellow Kamala
Mallotus philippensis	Red Kamala
Melicope elleryana	Pink Euodia
Neolitsea australiensis	Green Bolly Gum
Neolitsea dealbata	White Bolly Gum
Pararchidendron pruinosum	Snow Wood
Pittosporum revolutum	Hairy Pittosporum
Pittosporum undulatum	Sweet Pittosporum
Podocarpus elatus	Plum Pine
Polyscias elegans	Celery Wood
Premna lignum-vitae	Lignum Vitae
Rhodamnia rubescens	Scrub Turpentine
Sarcomelicope simplicifolia	Baurella
Sarcopteryx stipata	Steel Wood
Sloanea australis	Maiden's Blush
Stenocarpus sinuatus	Firewheel Tree
Sterculia quadrifida	Peanut Tree
Synoum glandulosum	Scentless Rosewood
Syzygium moorei	**Coolamon**
Syzygium oleosum	Blue Lily Pilly
Toechima dasyrrache	Blunt-leaved Steel Wood
Toona ciliata	Red Cedar
Wilkiea huegeliana	Veiny Wilkiea

Site 4: Exotic and non-local species

Scientific Name	Common Name
Ageratina adenophora	Crofton Weed
Ageratina riparia	Mist Weed
Ageratum houstonianum	Blue Billygoat Weed
Anredera cordifolia	Madeira Vine
Ardisia crenata	Ardisia
Asparagus plumosus	Climbing Asparagus
Cinnamomum camphora	Camphor Laurel
Commelina benghalensis	Hairy Commelina
Crocosmia x *crocosmiflora*	Montbretia
Desmodium intortum	Green-leaved Desmodium
Desmodium uncinatum	Silver-leaved Desmodium
Hypoestes phyllostachya	Freckle Face
Impatiens graveolens	Impatiens, Dizzy Lizzy
Koehlreuteria paniculata	Golden Rain Tree
Lantana camara	Lantana
Ligustrum lucidum	Large-leaved Privet
Ligustrum sinense	Small-leaved Privet
Murraya koenigii	Curry Plant
Murraya paniculata	Sweet Jessamine
Ochna serrulate	Ochna, Mickey Mouse Plant
Senna pendula var. *glabrata*	Winter Senna
Senna x floribunda	Smooth Senna
Syagrus romanzoffiana	Cocos Palm
Tradescantia fluminensis	Tradescantia
Tradescantia zebrina	Zebrina

Site 5: Native species

Scientific Name	Common Name
Alchornea ilicifolia	Native Holly
Anopterus macleayanus	Queensland Laurel
Backhousia citriodora	Lemon Myrtle (planted)
Brachychiton acerifolius	Flame Tree
Breynia oblongifolia	Coffee Bush
Citrus australasica	Finger Lime
Cryptocarya laevigata	Glossy Laurel
Cupaniopsis anacardioides	Tuckeroo
Dysoxylum mollissimum	Red Bean
Elaeocarpus grandis	Blue Quandong
Endiandra sieberi	Hard Corkwood
Eucalyptus robusta	Swamp Mahogany (planted)
Eupomatia laurina	Bolwarra
Ficus macrophylla	Moreton Bay Fig
Ficus watkinsiana	Strangler Fig

Ficus coronata	Creek Sandpaper Fig
Ficus superba	Deciduous Fig
Lophostemon confertus	Brushbox
Litsea australis	Bolly Gum
Lomandra longifolia	Spiny-headed Mat-rush
Mallotus phillippensis	Red Kamala
Macaranga tanarius	Macaranga
Oplismenus aemulus	Basket Grass
Pollia crispata	Pollia
Podocarpus elatus	Plum Pine
Syzygium francissi	Giant Water Gum

Site 5: Exotic and non-local species

Scientific Name	Common Name
Corymbia torelliana	Cadaghi
Araucaria heterophylla	Norfolk Pine
Syagrus romanzoffianum	Cocos Palm
Murraya paniculata	Mock Orange
Coffea arabica	Coffee
Tradescantia fluminensis	Trad
Ficus benjamina	Weeping Fig
Spathodea campanulata	African Tulip Tree
Sphagneticola trilobata	Singapore Daisy
Sechium edule	Choko
Coprosma repens	Coprosma
Schefflera actinophylla	Umbrella Tree
Senna pendula	Winter Senna
Neomarica gracilis	Walking Iris
Howea forsteriana	Kentia Palm
Desmodium intortum	Green-leaved Desmodium
Archtontophoenix alexandrae	Alexander Palm
Tabebuia chrysotricha	Golden Trumpet Tree
Ravenala madagascariensis	Travellers Palm
Eugenia uniflora	Brazillian Cherry
Ochna serrulata	Ochna
Ipomoea cairica	Coast Morning Glory
Koelreuteria paniculata	Golden Rain Tree
Cinnamomum camphora	Camphor Laurel
Jacaranda mimosifolia	Jacaranda
Aleurites moluccanus	Candle Nut
Dracaena marginata	Dracaena
Rumex crispa	Curled Dock
Passiflora subpeltata	White Passionflower
Ageratum houstonianum	Blue Billy Goat Weed
Paspalum mandiocanum	Broadleaved Paspalum
Panicum maximum	Guinea Grass

Scientific Name	Common Name
Cestrum nocturnum	Lady-of-the-night
Ricinus communis	Castor Oil
Solanum mauritianium	Tobacco Bush
Lantana camara	Lantana
Ligustrum lucidum	Large-leaved Privet
Ligustrum sinense	Small-leaved Privet
Syngonium podophyllum	Syngonium
Dracaena marginata	Dracaena
Salvia divinorum	Salvia
Solanum seaforthianum	Climbing Nightshade
Schinus molle var. *areira*	Broadleaf Pepper Tree
Bidens pilosa	Cobbler's Pegs

Site 6: Native species

Scientific Name	Common Name
Allocasuarina torulosa	Forest Oak
Alocasia brisbanensis	Cunjevoi
Argyrodendron trifoliolatum	White Booyong
Brachychiton discolor	Lacebark
Castanospermum australe	Black Bean
Davidsonia jerseyana	Davidson's Plum (planted)
Diploglottis australis	Native Tamarind
Dysoxylum fraserianum	Rosewood
Elaeocarpus grandis	Blue Quandong
Lophostemon confertus	Brushbox
Pittosporum undulatum	Native Daphne
Stenocarpus sinuatus	Firewheel Tree
Sloanea australis	Maidens Blush
Syzygium australe	Brush Cherry
Syzygium oleosum	Blue Lilly Pilly
Tristaniopsis laurina	Water Gum

Site 6: Exotic and non-local species

Scientific Name	Common Name
Agapanthis parecox	Agapanthus
Alloxylum flammeum	Dorrigo Waratah
Cestrum nocturnum	Lady-of-the-night
Cinnamomum camphora	Camphor Laurel
Clivea miniata	Clivea
Dracaena marginata	Dracaena
Epidendrum radicans	Crucifix Orchid
Howea forsteriana	Kentia Palm
Koelreuteria paniculata	Golden Rain Tree
Mangifera indica	Mango

Murraya paniculata	Murraya
Neomarica gracilis	Walking Iris
Persea americana	Avocado
Ravenala madagascariensis	Travellers Palm
Sequoiadendron giganteum	Sequoia
Spathodea campanulata	African Tulip Tree
Syngonium podophyllum	Arrowhead Vine
Syzygium wilsonii	Powderpuff Lilly Pilly
Tradescantia fluminensis	Trad
Xanthorrhoea australis	Grass Tree

Site 7: Cerreto Circuit Reserve

Native species

Scientific Name	Common Name
Syzygium cultivar	Lilly Pilly
Callistemon viminalis	Callistemon
Grevillea robusta	Silky Oak
Lomandra longifolia	Spiny-headed Mat-rush

Site 7: Exotic and non-local species

Scientific Name	Common Name
Brunfelsia pauciflora	Yesterday Today Tomorrow Plant
Cestrum nocturnum	Night Cestrum
Delonix regina	Poinciana
Duranta erecta	Duranta
Hibiscus rosa-sinensis	Hibiscus
Koelreuteria paniculata	Golden Rain Tree
Lagerstroemia indica	Crepe Myrtle
Ligustrum lucidum	Large-leaved Privet
Musa sp.	Banana
Murraya paniculata	Murraya
Magnolia grandiflora	Magnolia
Photinia robusta	Photinia
Tibouchina granulosa	Tibouchina
Tradescantia fluminensis	Trad

Site 8: Native species

Scientific Name	Common Name
Acacia melanoxylon	Sally Wattle
Allocasuarina torulosa	Forest Oak
Alocasia brisbanensis	Cunjevoi
Alphitonia excelsa	Red Ash
Argryodendron trifoliolatum	White Booyong
Calochlaena dubia	Soft Bracken
Ficus fraseri	Sandpaper Fig
Guioa semiglauca	Guioa
Homalanthus populifolius	Bleeding Heart
Juncus usitatus	Common Rush
Melicope elleryana	Pink Euodia
Persicaria decipiens	Slender Knotweed

Site 8: Exotic and non-local species

Scientific Name	Common Name
Ageratum houstonianum	Blue Billygoat Weed
Archtonphoenix alexandrae	Alexander Palm
Bidens pilosa	Cobbler's Pegs
Cecropia spp.	Cecropia
Cestrum nocturnum	Lady-of-the-night
Cinnamomum camphora	Camphor Laurel
Duranta erecta	Duranta
Dypsis lutescens	Golden Cane Palm
Howea forsteriana	Kentia Palm
Jacaranda mimosifolia	Jacaranda
Lantana camara	Lantana
Ligustrum lucidum	Large-leaved Privet
Murraya paniculata	Murraya
Nephrolepis cordifolia	Fishbone Fern
Paspalum mandiocanum	Broad-leaved Paspalum
Philodendron bipinnatifidum	Philodendron
Pinus elliottii	Slash Pine
Ricinus communis	Castor Oil
Sphagneticola trilobata	Singapore Daisy
Syagrus romanzoffianum	Cocos Palm
Syngonium podophyllum	Arrowhead Vine

Site 9: Native species

Scientific Name	Common Name
Acacia melanoxylon	Sally Wattle
Acmena hemilampra	Broad-leaved Lilly Pilly
Acmena ingens	Red Apple
Acmena smithii	Common Lilly Pilly
Acronychia oblongifolia	Common Acronychia
Alectryon tomentosus	Hairy Alectryon
Alpinia caerulea	Native Ginqer
Alocasia brisbanensis	Cunievoi
Alphitonia excelsa	Red Ash
Aphananthe philippinensis	Native Elm
Archidendron muellerianum	Veiny Laceflower
Archontophoenix cunninghamiana	Bangalow Palm
Arytera divaricata	Twin Leaved Coogera
Baloqhia inophvlla	Brush Bloodwood
Brachychiton acerifolius	Flame Tree
Bracychiton discolor	Lace Flower
Breynia oblongifolia	Breynia
Bridelia exaltata	Brush Ironbark
Castanospermum australe	Black Bean
Clerodendrum floribundum	Smooth Clerodendrum
Clerodendrum tomentosum	Hairy Clerodendron
Cordy/ine petiolaris	Palm Lily
Cordvline rubra	Red-fruited Palm Lily
Cordyline stricta	Narrow-leaved Palm Lily
Commersonia bartramia	Brown Kurrajong
Cryptocarya laevigata	Glossy Laurel
Cryptocarya glaucescens	Jackwood
Cryptocarya triplinervis	Three Veined Laurel
Cupaniopsis parvifolia	Small-leaved Tuckeroo
Davidsonia jerseyana	**Davidson's Plum**
Dianella caerulea	Blue Flax Lilly
Diploglottis australis	Native Tamarind
Duboisia myoporoides	Soft Corkwood
Dysoxylum mollissimum	Red Bean
Ehretia acuminata	Koda
Elaeocarpus obovatus	Hard Quandong
Elaeocarpus grandis	Blue Quandong
Elaeodendron australe	Red Olive Plum
Euroschinus falcata	Ribbonwood
Ficus coronata	Creek Sandpaper Fig
Ficus fraseri	Sandpaper Fig
Ficus macrophylla	Moreton Bay Fig
Ficus obligua	Small Leaf Fig
Ficus watkinsiana	Strangling Fig

Scientific Name	Common Name
Flindersia bennettiana	Bennett's Ash
Flindersia australis	Native Teak
Flindersia schottiana	Cudgerie
Flindersia xanthoxyla	Yellowwood
Geissois benthamii	Red Carabeen
Glochidion ferdinandi	Cheese Tree
Gmelina leichhardtii	White Beech
Grevillea robusta	Silky Oak
Guioa semiglauca	Guioa
Harpullia pendula	Tulipwood
Homalanthus nutans	Bleedinq Heart
Hymenosporum flavum	Native Frangipani
Jagera pseudorhus	Foambark
Lomandra hystrix	Mat Rush
Lomandra longifolia	Spiny headed Mat-rush
Macaranga tanarius	Macaranga
Mallotus discolor	Yellow Kamala
Mallotus philippensis	Red Kamala
Melia azedarach	White Cedar
Melicope micrococca	White Euodia
Neolitsea dealbata	White Bolly Gum
Pararchidendron pruinosum	Snowwood
Pilidiostigma glabrum	Plum Myrtle
Pittosporum undulatum	Sweet Pittosporum
Polyscias elegans	Celerywood
Polyscias murrayi	Pencil Cedar
Rhodamnia argentea	Malletwood
Rhodamnia rubescens	**Scrub Turpentine**
Rhodamnia maideniana	**Smooth Scrub Turpentine**
Rhodomyrtus psidioides	**Native Guava (planted, not found in 2023 survey)**
Linospadix monostachvus	Walking Stick Palm
Sloanea woollsii	Yellow Carabeen
Stenocarpus sinuatus	Firewheel Tree
Sterculia quadrifida	Peanut Tree
Syzygium australe	Brush Cherry
Syzygium corynanthum	Sour Cherry
Svzvqium luehmannii	Riberrv
Syzygium oleosum	Blue Lilly Pilly
Trema tomentosa var. *viridis*	Poison Peach
Toona ciliata	Red Cedar
Tristaniopsis laurina	Water Gum

Site 9: Exotic and non-local species

Scientific Name	Common Name
Ageratum houstonianum	Blue Billygoat Weed

Anredera cordifolia	Madeira Vine
Araujia sericifera	Moth Vine
Bidens pilosa	Cobbler's Pegs
Cestrum nocturnum	Lady-of-the-night
Cinnamomum camphora	Camphor Laurel
Desmodium intortum	Green-leaved Desmodium
Lantana camara	Lantana
Ligustrum lucidum	Large-leaved Privet
Paspalum mandiocanum	Broad-leaved Paspalum
Passiflora subpeltata	White Passionflower
Passiflora suberosa	Corky Passionfruit
Syagrus romanzoffianum	Cocos Palm
Sida rhombifolia	Paddy's Lucerne
Solanum mauritianium	Tobacco Bush
Solanum seaforthianum	Climbing Nightshade

Site 10: Native Species

Scientific Name	Common Name
Ficus macrophylla	Moreton Bay Fig
Homolanthus populifolius	Bleeding Heart
Lomandra longifolia	Spiny-headed Mat-rush
Melaleuca nodosa	Prickly-leaved Paperbark
Commersonia bartramia	Brown Kurrajong
Callistemon 'Little John'	A Bottle Brush cultivar

Site 10: Exotic and non-local species

Scientific Name	Common Name
Ageratum houstonianum	Blue Billygoat Weed
Bidens pilosa	Cobbler's Pegs
Ligustrum lucidum	Large-leaved Privet
Paspalum mandiocanum	Broad-leaved Paspalum
Passiflora suberosa	Corky Passionfruit
Sida rhombifolia	Paddy's Lucerne
Solanum mauritianium	Tobacco Bush
Solanum seaforthianum	Climbing Nightshade

Site 11: Native species

Scientific Name	Common Name
Acacia melanoxylon	Sally Wattle
Acmena smithii	Lilly Pilly
Acronychia oblongifolia	Common Acronychia
Alphitonia excelsa	Red Ash
Alpinia caerulea	Native Ginger
Brachychiton acerifolius	Flame Tree
Callistemon salignus	White Bottlebrush
Commersonia bartramia	Brown Kurrajong
Cordyline petiolaris	Palm Lilly
Cyathea cooperi	Coin-spot Tree Fern
Elaeocarpus grandis	Blue Quandong
Ficus coronata	Creek Sandpaper Fig
Ficus fraseri	Sandpaper Fig
Ficus obliqua	Small leaf Fig
Ficus watkinsiana	Strangler Fig
Flindersia schottiana	Cudgerie
Glochidion ferdinandi	Cheese Tree
Grevillea robusta	Silky Oak
Homalanthus populifolius	Bleeding Heart
Lophostemon confertus	Brushbox
Macaranga tanarius	Macaranga
Mallotus philippensis	Red Kamala
Lomandra longifolia	Spiny-headed Mat-rush
Pittosporum undulatum	Sweet Pittosporum
Polyscias elegans	Celery Wood
Polyscias murrayi	Pencil Cedar
Syzygium luehmannii	Riberry
Syzygium oleosum	Blue Lilly Pilly

Site 11: Exotic and non-local species

Scientific Name	Common Name
Ageratum houstonianum	Blue Billygoat Weed
Archontophoenix alexandrae	Alexander Palm
Bidens pilosa	Cobbler's Pegs
Cestrum nocturnum	Lady-of-the-night
Cinnamomum camphora	Camphor Laurel
Colocasia esculenta	Taro
Desmodium uncinatum	Silver-leaved Desmodium
Lantana camara	Lantana
Ligustrum lucidum	Large-leaved Privet
Nandina schizolobium	Nandina
Paspalum mandiocanum	Broad-leaved Paspalum
Passiflora subpeltata	White Passionflower
Passiflora suberosa	Corky Passionfruit
Syagrus romanzoffianum	Cocos Palm

Scientific Name	Common Name
Sida rhombifolia	Paddy's Lucerne
Solanum mauritianium	Tobacco Bush
Solanum seaforthianum	Climbing Nightshade
Tipuana tipu	Tree of Heaven

Site 12: Native species

Scientific Name	Common Name
Acacia melanoxylon	Sally Wattle
Acmena hemilampra	Broad-leaved Lilly Pilly
Acmena ingens	Red Apple
Acmena smithii	Common Lilly Pilly
Acronychia oblongifolia	Common Acronychia
Acronychia octandra	Doughwood
Actephila lindleyi	Actephila
Alectryon tomentosus	Hairy Alectryon
Alpinia caerulea	Native Ginger
Alphitonia excelsa	Red Ash
Alocasia brisbanensis	Cunjevoi
Aphananthe philippinensis	Native Elm
Archidendron hendersonii	White Laceflower
Archidendron muellerianum	Veiny Laceflower
Archontophoenix cunninghamiana	Bangalow Palm
Arytera divaricate	Twin Leaved Coogera
Baloghia inophylla	Brush Bloodwood
Baumea rubiginosa	Soft Twig Rush
Brachychiton acerifolius	Flame Tree
Brachychiton discolor	Lace Flower
Breynia oblongifolia	Breynia
Bridelia exaltata	Brush Ironbark
Capparis arborea	Brush Caper Berry
Carex appressa	Tall Sedge
Castanospermum australe	Black Bean
Castanospora alphandii	Brown Tamarind
Cinnamomum oliveri	Oliver's Sassafras
Cinnamomum virens	Red-barked Sassafras
Clerodendrum floribundum	Smooth Clerodendrum
Clerodendrum tomentosum	Hairy Clerodendron
Commersonia bartramia	Brown Kurrajong
Cordyline petiolaris	Palm Lily
Cordyline rubra	Red-fruited Palm Lily
Cordyline stricta	Narrow-leaved Palm Lily
Croton verreauxii	Native Cascarilla
Cryptocarya glaucescens	Jackwood
Cryptocarya laevigata	Glossy Laurel
Cryptocarya microneura	Murrogun

Scientific Name	Common Name
Cryptocarya obovate	Pepperberry
Cryptocarya triplinervis var. *pubens*	Three Veined Cryptocarya
Cupaniopsis parvifolia	Small-leaved Tuckeroo
Cyathea australis	Rough Tree Fern
Cyathea cooperi	Scaly Tree Fern
Daphnandra micrantha	Socketwood
Decaspermum humile	Silky Myrtle
Dianella caerulea	Blue Flax Lilly
Diospyros australis	Black Plum
Diospyros pentamera	Myrtle Ebony
Diploglottis australis	Native Tamarind
Duboisia myoporoides	Soft Corkwood
Dysoxylum mollissimum	Red Bean
Dysoxylum rufum	Hairy Rosewood
Ehretia acuminata	Koda
Elaeocarpus grandis	Blue Quandong
Elaeocarpus kirtonii	Silver Quandong
Elaeocarpus obovatus	Hard Quandong
Elaeodendron australe	Red Olive Plum
Elattostachys nervosa	Green Tamarind
Eleocharis acuta	Common Spike Rush
Endiandra muelleri	Green-leaved Rose Walnut
Endiandra pubens	Hairy Walnut
Eupomatia laurina	Bolwarra
Euroschinus falcata	Ribbonwood
Ficus coronata	Creek Sandpaper Fig
Ficus fraseri	Sandpaper Fig
Ficus macrophylla	Moreton Bay Fig
Ficus obliqua	Small Leaf Fig
Ficus watkinsiana	Strangling Fig
Flindersia australis	Native Teak
Flindersia bennettiana	Bennett's Ash
Flindersia schottiana	Cudgerie
Flindersia xanthoxyla	Yellowwood
Gahnia aspera	Rough Saw Sedge
Gahnia sieberiana	Red Fruited Saw Sedge
Geissois benthamii	Red Carabeen
Glochidion ferdinandi	Cheese Tree
Gmelina leichhardtii	White Beech
Gossia bidwillii	Python Tree
Guioa semiglauca	Guioa
Harpullia hillii	Blunt-leaved Tulip
Harpullia pendula	Tulipwood
Hedraianthera porphyropetala	Hedraianthera
Helicia glabrifolia	Smooth Helicia
Helmholtzia glaberrima	Stream Lily

Scientific Name	Common Name
Heritiera trifoliata	White Booyong
Homalanthus nutans	Bleeding Heart
Hymenosporum flavum	Native Frangipani
Jagera pseudorhus	Foambark
Juncus usitatus	Tussock Rush
Linospadix monostachyus	Walking Stick Palm
Litsea australis	Brown Bolly Gum
Litsea reticulatus	Bolly Gum
Lomandra hystrix	Mat Rush
Lomandra longifolia	Spiny headed Mat-rush
Macadamia tetraphylla	Rough-shelled Bush Nut
Macaranga tanarius	Macaranga
Mallotus discolor	Yellow Kamala
Mallotus philippensis	Red Kamala
Melia azedarach	White Cedar
Melicope micrococca	White Euodia
Melicope octandra	Doughwood
Mischocarpus australis	Red Pear-fruit
Mischocarpus pyriformis	Yellow Pear-fruit
Neolitsea australiensis	Green Bolly Gum
Neolitsea dealbata	White Bolly Gum
Notelaea johnsonii	Veinless Mock-Olive
Olea paniculate	Native Olive
Philydrum lanuginosum	Frogsmouth
Pararchidendron pruinosum	Snowwood
Pentaceras australe	Crows Ash
Pilidiostigma glabrum	Plum Myrtle
Pittosporum undulatum	Sweet Pittosporum
Polyscias elegans	Celerywood
Polyscias murrayi	Pencil Cedar
Pouteria australis	Black Apple
Rhodamnia argentea	Malletwood
Rhodamnia maideniana	**Smooth Scrub Turpentine**
Rhodamnia rubescens	**Scrub Turpentine**
Rhodomyrtus psidioides	**Native Guava (planted, not found in 2023 survey)**
Rhysotoechia bifoliolata	Twin Leaved Tuckeroo
Sambucus australasica	Native Elderberry
Sarcomelicope simplicifolia	Bauerella
Sarcopteryx stipata	Steelwood
Scolopia braunii	Flintwood
Schoenoplectus mucronatus	Sedge
Sloanea australis	Maidens Blush
Sloanea woollsii	Yellow Carabeen
Stenocarpus sinuatus	Firewheel Tree
Sterculia quadrifida	Peanut Tree
Streblus brunonianus	Whalebone

Scientific Name	Common Name
Symplocos stawellii	White Hazelwood
Symplocos thwaitesii	Buff Hazelwood
Synoum glandulosum	Scentless Rosewood
Syzygium australe	Brush Cherry
Syzygium corynanthum	Sour Cherry
Syzygium crebrinerve	Purple Cherry/Rose Satinash
Syzygium francisii	Giant Water Gum
Syzygium luehmannii	Riberry
Syzygium oleosum	Blue Lilly Pilly
Tabernaemontana pandacaqui	Banana Bush
Toechima dasyrrhache	Blunt-leaved Steelwood
Toona ciliata	Red Cedar
Trema tomentosa var *viridis*	Native Peach
Tristaniopsis laurina	Water Gum
Wilkiea austroqueenslandica	Smooth Wilkiea
Wilkiea huegeliana	Veiny Wilkiea
Wilkiea macrophylla	Large-leaved Wilkiea

Site 12: Exotic and non-local species

Scientific Name	Common Name
Ageratum houstonianum	Blue Billygoat Weed
Ageratina adenophora	Crofton Weed
Archontophoenix alexandrae	Alexander Palm
Bidens pilosa	Cobbler's Pegs
Cestrum nocturnum	Lady-of-the-night
Cinnamomum camphora	Camphor Laurel
Colocasia esculenta	Taro
Corymbia torelliana	Cadaghi
Desmodium uncinatum	Silver-leaved Desmodium
Lantana camara	Lantana
Ligustrum lucidum	Large-leaved Privet
Paspalum mandiocanum	Broad-leaved Paspalum
Passiflora edulis	Edible Passionfruit
Passiflora subpeltat	White Passionflower
Passiflora suberosa	Corky Passionfruit
Setaria sphacelata	Setaria
Syagrus romanzoffianum	Cocos Palm
Sida rhombifolia	Paddy's Lucerne
Solanum mauritianium	Tobacco Bush
Sphagneticola trilobata	Singapore Daisy

Site 13: Native Species

Scientific Name	Common Name
Acacia melanoxylon	Sally Wattle
Cyathea leichardtiana	Tree Fern

Cyperus sp.	Sedges
Typha orientalis	Typha

Site 13: Exotic and non-local species

Scientific Name	Common Name
Ageratum houstonianum	Blue Billygoat Weed
Ageratina adenophora	Crofton Weed
Archontophoenix alexandrae	Alexander Palm
Bidens pilosa	Cobbler's Pegs
Cestrum nocturnum	Lady-of-the-night
Cinnamomum camphora	Camphor Laurel
Colocasia esculenta	Taro
Desmodium uncinatum	Silver-leaved Desmodium
Lantana camara	Lantana
Ligustrum lucidum	Large-leaved Privet
Paspalum mandiocanum	Broad-leaved Paspalum
Passiflora edulis	Edible Passionfruit
Passiflora subpeltata	White Passionflower
Passiflora suberosa	Corky Passionfruit
Setaria sphacelata	Setaria
Sida rhombifolia	Paddy's Lucerne
Solanum mauritianium	Tobacco Bush
Sphagneticola trilobata	Singapore Daisy

Site 14: Native Species

Scientific Name	Common Name
Acacia melanoxylon	Sally Wattle
Ficus coronata	Creek Sandpaper Fig
Guioa semiglauca	Guioa
Macaranga tanarius	Macaranga
Wilkiea huegeliana	Veiny Wilkiea

Site 14: Exotic and non-local species

Scientific Name	Common Name
Ageratum houstonianum	Blue Billygoat Weed
Ageratina adenophora	Crofton Weed
Archontophoenix alexandrae	Alexander Palm
Bidens pilosa	Cobbler's Pegs
Cestrum nocturnum	Lady-of-the-night
Cinnamomum camphora	Camphor Laurel
Colocasia esculenta	Taro
Desmodium uncinatum	Silver-leaved Desmodium
Lantana camara	Lantana
Ligustrum lucidum	Large-leaved Privet
Paspalum mandiocanum	Broad-leaved Paspalum
Passiflora edulis	Edible Passionfruit
Passiflora subpeltata	White Passionflower

Passiflora suberosa	Corky Passionfruit
Setaria sphacelata	Setaria
Sida rhombifolia	Paddy's Lucerne
Solanum mauritianium	Tobacco Bush
Sphagneticola trilobata	Singapore Daisy

Site 15: Native Species

Scientific Name	Common Name
Dianella caerulea	Dianella
Lomandra longifolia	Spiny-Headed Mat-rush
Mixed rainforest trees and shrubs	

Site 15: Exotic and non-local species

Scientific Name	Common Name
	No weeds – well mulched

APPENDIX 2 – WEED CONTROL METHODS

"**Cut-scrape-paint" method**: This method applies to all woody shrubs, trees and some vines e.g. Camphor Laurel, Winter Senna, Lantana.

(a) Cut plant low to the ground at an angle.
(b) Apply herbicide immediately at the rate of 1 part glyphosate to 1 part water with a paintbrush approximately 1.5cm wide.
(c) Scrape sides lightly to reveal green tissues and apply the herbicide to the scraped area.
(d) Take care that the brush is not contaminated with soil.

This method is modified to Scrape and Paint for fleshy vines such as Madeira Vine and Syngonium. The thick stems are scraped (length of approximately 15cm) from base to head height and painted taking care not to break the vine.

Stem Injection: This method applies to all woody trees and shrubs with a stem diameter >6cm, e.g., Camphor Laurel, Large-leaved Privet and Coral Tree.

(a) With a drill (10mm bit), drill a hole at a downwards and transverse angle into the stem.
(b) Apply herbicide immediately into the cut using a tree injecting device (using glyphosate, apply at the rate of 1:1).
(c) Repeat at spaces of 10cm around the circumference of the tree, as close to the ground as possible. Where the presence of a crotch angle makes this difficult, make a hole above it. (**Note**: One row is sufficient. larger trunk diameters will need correspondingly more).
(d) Treat all visible lateral roots as per (a).

Spot Spraying: This is carried out using a 15 litre back-pack spray unit with a modified spray nozzle that gives a solid spray pattern. Glyphosate is the main herbicide used, with the addition of the red markerdye. For plants which show some resistance to herbicides e.g. Ground Asparagus, or when growing conditions are not optimal, a penetrant is also added. A mixture of glyphosate and Metsulphuron Methyl is approved for plants that are difficult to control with glyphosate alone (Note: an appropriate permit is required for this 'off-label' herbicide usage).

Overspray: This method is applicable to large, dense infestations of such plants as Lantana and exotic grasses where it is desirable to leave the dead plants intact to prevent erosion and over-exposure of large areas, to protect native seedlings from predators such as wallabies and to avoid trampling by humans.

(a) Spray over the top of the infestation, using a solution of glyphosate (Note: any native plants thatmay be under the weed will be protected by the foliage cover of the weed).
(b) Leave the sprayed plants intact so that native seedlings can establish under the shelter provided. Note: Example: for Lantana, the usual dilution rate for glyphosate 360 is 1**:**75 water**;** for exotic grasses glyphosate 1**:**100 water. Always follow the label instructions.
Alternatively, weeds can be cut and flattened with brush-hooks or loppers and the subsequent regrowth sprayed with glyphosate.

Crowning: This method is applicable to weeds which have their growing points below the surface of the ground (corms, bulbs, rhizomes, clumped or fibrous root systems etc. e.g. *Asparagus* spp. and exotic grasses).

(a) Grasp the leaves or stems and hold them tightly so that the base of the plant is visible. Plants with

sharp leaves or stems should be cut back first.

(b) Insert the knife close to the base of the plant at a slight angle, with the tip well under the root system.

(c) Cut through the roots close to the base. Depending on the size of the plant, two or more cuts maybe needed to sever all the roots.

(d) Remove the plant. Make sure that the base of the plant where the roots begin is completely removed.

Hand Pull: Gently pull seedling out by the roots, wriggling the plant to fully free them.

APPENDIX 3 – AHIMS EXTENSIVE SEARCH

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Wollongbar extensive
Client Service ID : 732750

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
04-4-0095	KL-OS-1	AGD	56	541350	6810450	Open site	Valid	Artefact : -		4454
	Contact	Recorders	Mrs.Robynne Mills					Permits	1881,3000	
04-4-0106	Wollongbar	AGD	56	540700	6812100	Open site	Valid	Artefact : 1		
	Contact T Russell	Recorders	Jali Local Aboriginal Land Council					Permits		
04-4-0246	Wollongbar East	GDA	56	541614	6811232	Open site	Valid	Water Hole : 1		
	Contact Jali Local Aboriginal Land Cou	Recorders	Jali Local Aboriginal Land Council					Permits		
04-4-0247	Byrnes Lane	GDA	56	544114	6812131	Open site	Valid	Water Hole : 1		
	Contact Jali Local Aboriginal Land Cou	Recorders	Jali Local Aboriginal Land Council					Permits		

**** Site Status**
Valid - The site has been recorded and accepted onto the system as valid
Destroyed - The site has been completely impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There is nothing left of the site on the ground but proponents should proceed with caution.
Partially Destroyed - The site has been only partially impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There might be parts or sections of the original site still present on the ground
Not a site - The site has been originally entered and accepted onto AHIMS as a valid site but after further investigations it was decided it is NOT an aboriginal site. Impact of this type of site does not require permit but Heritage NSW should be notified

Report generated by AHIMS Web Service on 16/11/2022 for Sandra Pimm for the following area at Lat, Long From : -28.8331, 153.3946 - Lat, Long To : -28.813, 153.4563. Number of Aboriginal sites and Aboriginal objects found is 4

This information is not guaranteed to be free from error omission. Heritage NSW and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

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