

Vegetation Management Plan

72 Lawlers Lane, Bangalow
Lot 2 DP 1007622



October 2021

Report prepared for JD Town Planning



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DISCLAIMER

This report is prepared by Bushland Restoration Services Pty Ltd for the client's purposes only. This report is prepared with information supplied by the client and on information obtained using accepted survey and assessment methodology. While due care was taken during field survey and report preparation, no responsibility is accepted for information that is withheld, incorrect or that is inaccurate. This report has been compiled at the level of detail specified in the report and no responsibility is accepted for interpretations made at more detailed levels than so indicated.

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1. INTRODUCTION

Bushland Restoration Services Pty Ltd have been commissioned by JD Town Planning Pty Ltd to prepare this Vegetation Management Plan (VMP) for Lot 2 DP 1007622 at 72 Lawlers Lane, Bangalow. The allotment is approximately 37 hectares in area and will hereafter be referred to as ‘the site’.

The VMP is in response to *Byron Shire Council Development Control Plan 2014: Chapter-D3-Tourist-Accommodation* requirement to provide 900 trees per cabin (or equivalent restoration) for a proposed 12-cabin Rural Tourist development. Since Camphor Laurel is the dominant canopy species over the site, it is intended to undertake ecological restoration toward a Subtropical Rainforest community, with minor tree planting in larger canopy gaps. Performance Criterion 8 in Section D3.3.4 of the DCP requires environmental repairs:

- to be focused on the expansion of wildlife corridors, repairing and reconnecting vegetation remnants and enhancing riparian areas and habitat for threatened species and endangered plant communities.

Table 1: Calculation of equivalent restoration area

Requirement	Requirement for 12 cabins	Area occupied by 10,800 trees at 1.5m spacing	Equivalent Restoration Area required (weed-dominated site – twice the area)
900 trees per cabin	10,800 trees	2.43ha	4.86ha

This Vegetation Management Plan focuses on restoration of habitat in the south of the property, including the headwaters of a second-order unnamed stream, as the highest recognized environmental value on the site at the present time. The proposed twelve-cabin development generates a requirement for 10,800 trees. This VMP proposes that 800 of these trees be planted in canopy gaps totalling 2000m² in area. The remaining 10,000 trees will be replaced with ecological restoration works over approximately 5ha of Camphor Laurel-dominated forest.

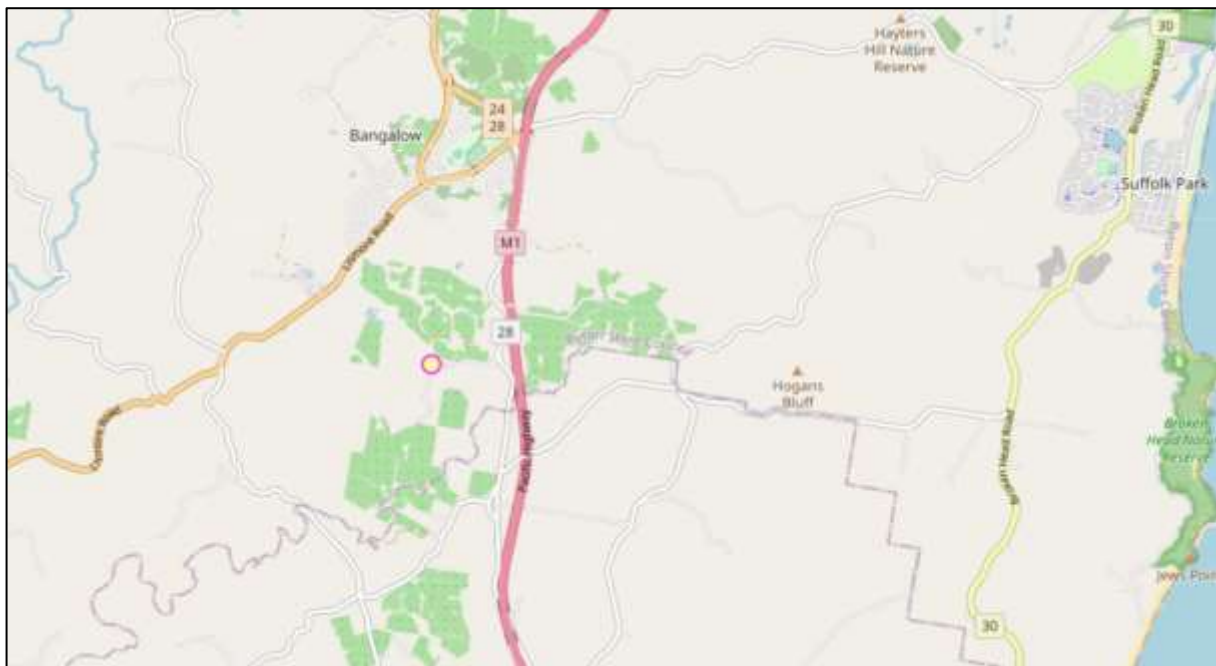


Figure 1: Site location indicated by yellow dot above.

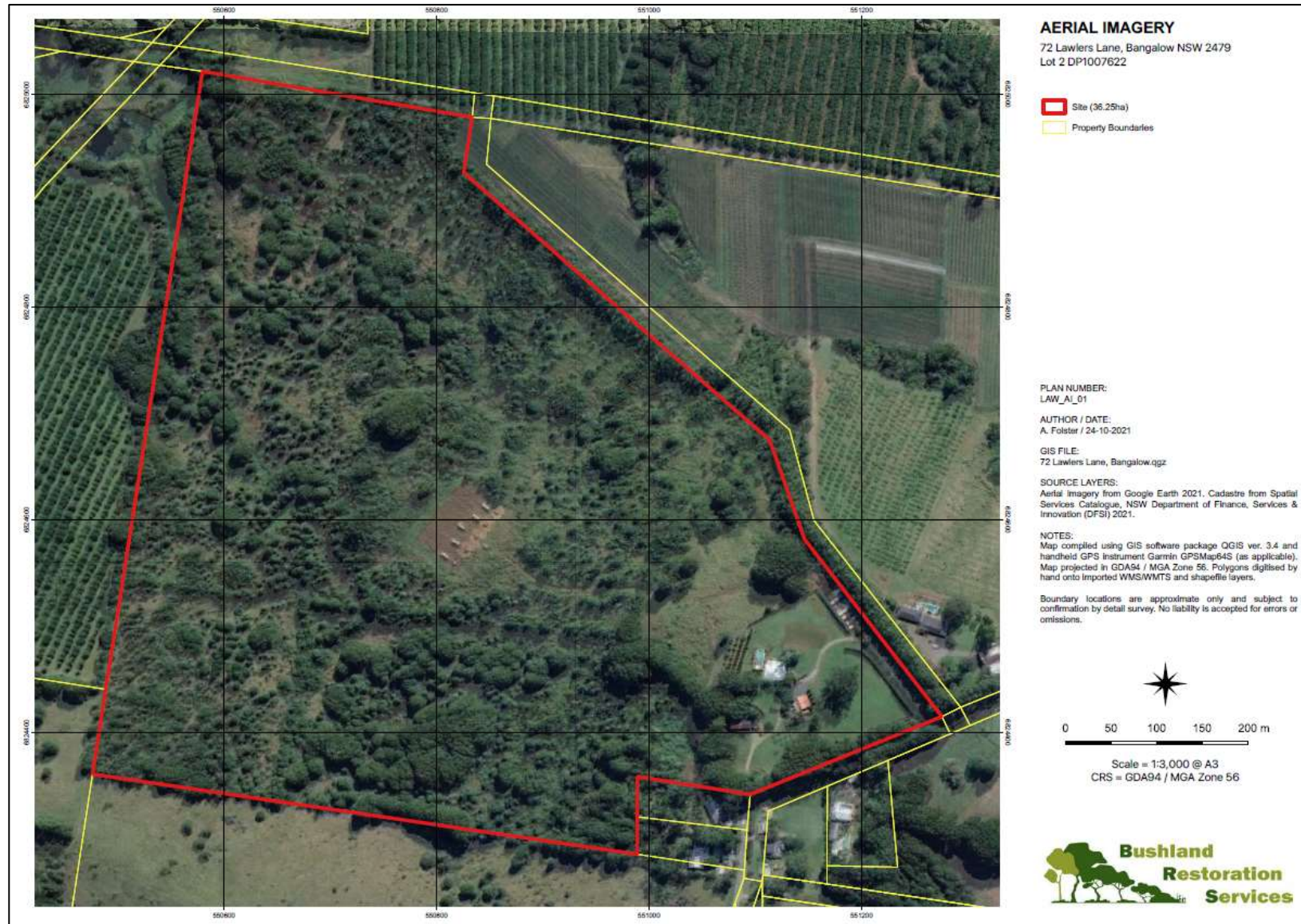


Figure 2: Aerial view of the property currently, seven years after Camphor Laurel harvesting.

1.1 Aims and Objectives

The aims of this Vegetation Management Plan (VMP) are to improve the condition of retained vegetation and fauna habitat over the site and to satisfy Council requirements in terms of habitat restoration sufficient to enable twelve cabins on the property.

The objectives of this plan are to:

- Restore approximately 5 hectares of Camphor Laurel-dominated forest to Subtropical Rainforest.
- Control exotic and invasive species within the 'Habitat Restoration Management Area.'
- To provide educational and amenity value for proposed accommodation guests.

1.2 Development Description

Development Consent is being sought for twelve cabins for short-term visitor use, clustered together toward the east of the property, with a central cooking and amenities building.



Plate 1: Proposed cabin area, looking north-west over the property



Plate 2: Proposed cabin area, looking south-west to edge of vegetation management area



Plate 3: Proposed cabin area, looking south-east

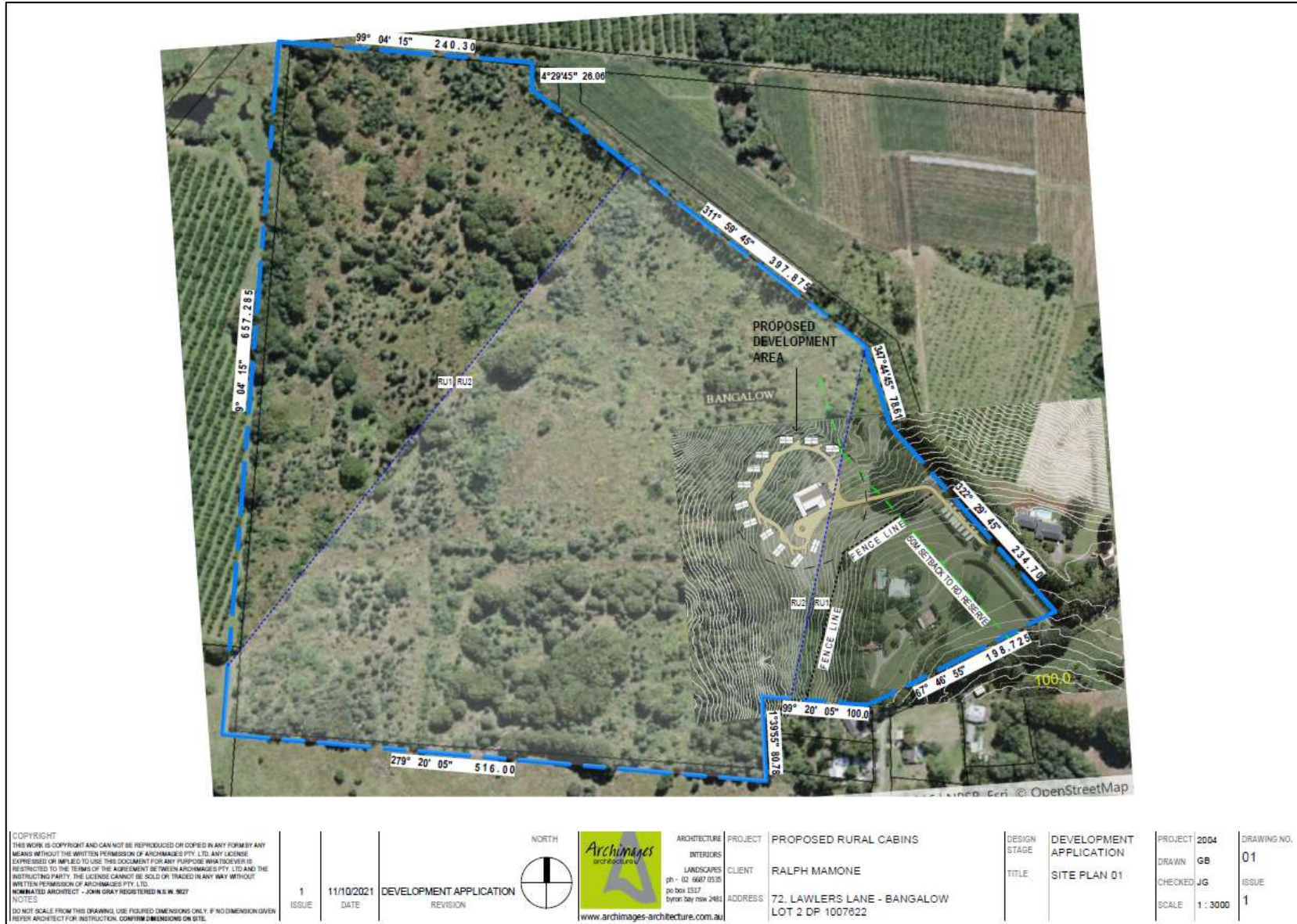


Figure 3: Aerial view showing the location of proposed cabins

2. SITE DESCRIPTION

2.1 Property Details

The site comprises a large freehold allotment which borders an unformed crown road on its eastern boundary. The property is surrounded by farmland used for grazing or orchard crops, primarily Macadamias with some stone fruit.

Table 2 – Summary of site details.

Landowner:	Ralph Mamone
Land Tenure:	Freehold / Private
Property Address:	72 Lawlers Lane, Bangalow
Real Property Description (RPD):	Lot 2 DP 1007622
Land Area:	Approximately 37ha
LGA:	Byron Shire Council (BSC)
Landuse Zoning:	Byron LEP 2014 - RU2 Rural Landscape through the centre two-thirds of the property. RU1 Primary Production in the east and west.

2.2 Site History

The centre of the property contains free-range chicken enclosures in use, but otherwise does not have a recent history of agriculture, though the weedy regrowth nature of much of the vegetation indicates historical clearing. The site contains an original dwelling and large sheds. Macadamia orchards occur on surrounding lands.

2.3 Site Access

The site is accessible by vehicle from Lawlers Lane, with two driveways entering the property. The eastern driveway leads along the eastern side of the property where unformed parking is available and a rough track leads to the chicken sheds. This track may be traversable by four-wheel-drive in fine weather but would not be traversable in wet weather. This is the best access to the proposed restoration area. The western driveway leads to the existing house and garden, where walking access is limited to the upper parts of the property.

2.4 Topography, Geology and Soils

Most of the site consists of low rolling hills with elevation ranging from 130 m in the south-east corner to 50m in the north-west. Ridges and crests are narrow to moderately broad and streams are erosional, tributary and integrated. Geology is of volcanic origin, consisting of Lismore Basalts — Tertiary basalt with bole and minor agglomerate. Soils here within the Alstonville Plateau area are described as the Bangalow soil landscape by Morand (1996) and are moderately deep to deep, well-drained Krasnozems and deep, poorly drained alluvial Krasnozems in drainage lines.

2.5 Vegetation Overview

The vegetation of the site is characterised as consisting of one broad vegetation community as derived from Byron Shire Council vegetation mapping (2017) and site visits in preparation of this report. The site would once have supported Subtropical Rainforest known as the 'Big Scrub'. Clearing and subsequent Camphor Laurel harvest in 2015 mean the site is now dominated by Camphor Laurel and Privet in all strata. This vegetation does not equate to any NSW Plant Community Type (PCT). A full flora inventory is included in Appendix 1.

2.6 Habitat Values

The site supports some habitat and forage resources for rainforest pigeons, which use Camphor Laurel fruit in winter when fruit resources become scarce in the more elevated and mountainous forests. Dense grassland areas can provide cover for small mammals. No threatened species have been recorded on the property.

2.7 Landscape Context and Connectivity

The site is not part of a mapped regional or subregional fauna corridor. Broken Head Nature Reserve is the closest National Parks estate to the site, approximately 9km to the east. Several scattered Big Scrub remnants occur some 5km or greater from the property in all directions around the site. A large Moreton Bay Fig Tree adjacent the existing house is mapped by BSC as 'high environmental value'. It could form part of a 'stepping-stone' corridor connection in the larger landscape, though weeds dominate the ground layer beneath, and the tree is isolated from other rainforest vegetation. First and second-order drainage lines connect to Byron Creek 2km to the north-west.

2.8 Threatened Species and Endangered Ecological Communities

The site does not contain any BioNet records of threatened flora or fauna species and site survey did not detect any on the property. The vegetation does not constitute any Endangered Ecological Communities (EECs) as listed in Schedules 1 and 2 of the *Biodiversity Conservation Act 2016 (NSW)*.

Threatened species recorded within 5km include:

- Koala *Phascolartus cinereus* – many records around Bangalow township, where significant additional planting has been undertaken in recent years.
- Grey-headed Flying-fox *Pteropus poliocephalus* – a camp is known from Bangalow township along the creek.
- Coolamon *Syzygium moorei*, and
- Rough-shelled Bush Nut *Macadamia tetraphylla*.

3. RELEVANT ENVIRONMENTAL LEGISLATION

Table 3: Matters of NATIONAL Environmental Significance and their relevancy to the site under the *Environmental Planning and Biodiversity Conservation Act (EPBC Act)*

Matter of National Environmental Significance	Relevancy to the proposed activity
World Heritage Properties	None
National Heritage Places	None
Wetlands of International Significance (Ramsar Sites)	None
Great Barrier Reef Marine Park	None
Commonwealth Marine Areas	None
Threatened Ecological Communities	None
Threatened Species	One –Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)-Vulnerable. No suitable Koala habitat occurs on site.
Migratory Species	13 identified, comprised of 2 marine bird species, 7 terrestrial birds and 4 wetland specialists. All other species identified are marine species (birds, whales, sharks and turtles) or terrestrial birds. These species are highly mobile and the disturbance footprint and type of development proposed represents a small area relative to their home ranges. Accordingly, these species are not expected to be significantly impacted upon by the vegetation management works.

Table 4: Matters of STATE Environmental Significance and their relevancy to the site under legislation as listed below

NSW legislation	Environmental Significance/ Relevancy to the proposed activity
Biodiversity Conservation Act 2016	<p>-The site is not mapped on the Biodiversity Values Map. None of the site's vegetation comprises 'high biodiversity value'.</p> <p>-The only vegetation removal required to achieve the development is Camphor Laurel and Large-leaved Privet, which does not constitute loss of native vegetation.</p> <p>-The development does not comprise any prescribed impacts listed under the Act.</p> <p>- None of the triggers to require entry into the Biodiversity Offsets Scheme are met.</p>
	<p>-Listed Endangered Ecological Communities (EEC) recorded on site</p> <ul style="list-style-type: none"> • None <p>-Listed EEC considered –<i>Subtropical Rainforest on the NSW North Coast</i></p> <p>-Listed Plant Community Types (PCTs) classed as EEC – None</p>
	Threatened Species - none recorded on site or nearby surrounds. None are likely to be significantly impacted by site or restoration works.

NSW legislation	Environmental Significance/ Relevancy to the proposed activity	
Relevant Environmental Planning Instruments	Relevant?	
<i>State Environmental Planning Policy Coastal Management</i>	No	The subject site is located outside the coastal zone and no 'Coastal Wetland' or 'Littoral Rainforest' mapping or buffers occur on or nearby the property.
<i>State Environmental Planning Policy Koala Habitat Protection</i>	No	The site is zoned Rural and is outside the Koala Plan of Management coastal area.



Plate 3: A constructed rock wall with potential heritage value occurs within the Vegetation Management Area. Re-shooting Camphor Laurel dominates here.

4. FLORA SURVEY

Byron Shire Council's vegetation mapping for the site was ground-truthed to ascertain vegetation community types, condition, dominant weed species, and habitat values in August and September 2021. Surveyed flora was classified by dominant species, vegetation height, percentage vegetation cover (%) and structural formation.

The Byron Shire Council (BSC) vegetation community mapping was found to be generally accurate. A description of surveyed vegetation is provided below and a comprehensive list of all flora species recorded during field survey has been compiled (Appendix 1).

4.1 Vegetation Communities

Only one vegetation community (VC) type was recorded during field survey and this is generally comparable with BSC vegetation community mapping, described as follows:

Table 5: Vegetation Community 1 – Camphor Laurel-dominated regrowth rainforest

<i>Camphor Laurel +/- Guioa +/- Sweet Pittosporum open to closed forest</i>	
Upper stratum:	Camphor Laurel <i>Cinnamomum camphora</i> * (60-90%). Occasional or single native mature trees of the following: <i>Guioa Guioa semiglauca</i> , Sweet Pittosporum <i>Pittosporum undulatum</i> , Foambark <i>Jagera pseudorhus</i> , Hard Quandong <i>Elaeocarpus obovatus</i> , Silky Oak <i>Grevillea robusta</i> and Small-leaved Fig <i>Ficus obliqua</i> .
Middle stratum:	Weed species 30-80% comprised mainly of Small-leaved Privet <i>Ligustrum sinense</i> *, Large-leaved Privet <i>Ligustrum lucidum</i> *, <i>Ochna Ochna serrulata</i> *, <i>Exotic Ginger</i> *. Natives - Pink- flowered Doughwood <i>Melicope elleryana</i> ; <i>Guioa Guioa semiglauca</i> , Pepperberry <i>Crypocarya obovata</i> and Foam Bark <i>Jagera pseudorhus</i> .
Ground stratum:	Weed species 30-70% comprised of <i>Ochna</i> *, Small-leaved Privet*, Large-leaved Privet*, Coral Berry <i>Ardisia crenata</i> *, Mistflower <i>Ageratina riparia</i> *; Crofton Weed <i>Ageratina adenophora</i> * and Trad <i>Tradescantia fluminensis</i> *. Natives – Cockspur <i>Maclura cochinchinensis</i> , Broad-leaf Palm Lily <i>Cordyline petiolaris</i> Soft Bracken <i>Calochlaena dubia</i> ; Spiny-headed Mat-Rush <i>Lomandra longifolia</i> , plus numerous seedlings and saplings of native tree species and Camphor Laurel* and Privet*.
Condition summary:	Poor. Weed-dominated regenerating community with very low diversity. Good canopy coverage from Camphor Laurel across most of the community, with open gaps between. Mixed weed and native regeneration evident in lower strata. Infiltration of exotic pasture grasses, Mistflower and Crofton Weed, particularly in canopy gaps.

*Weed species

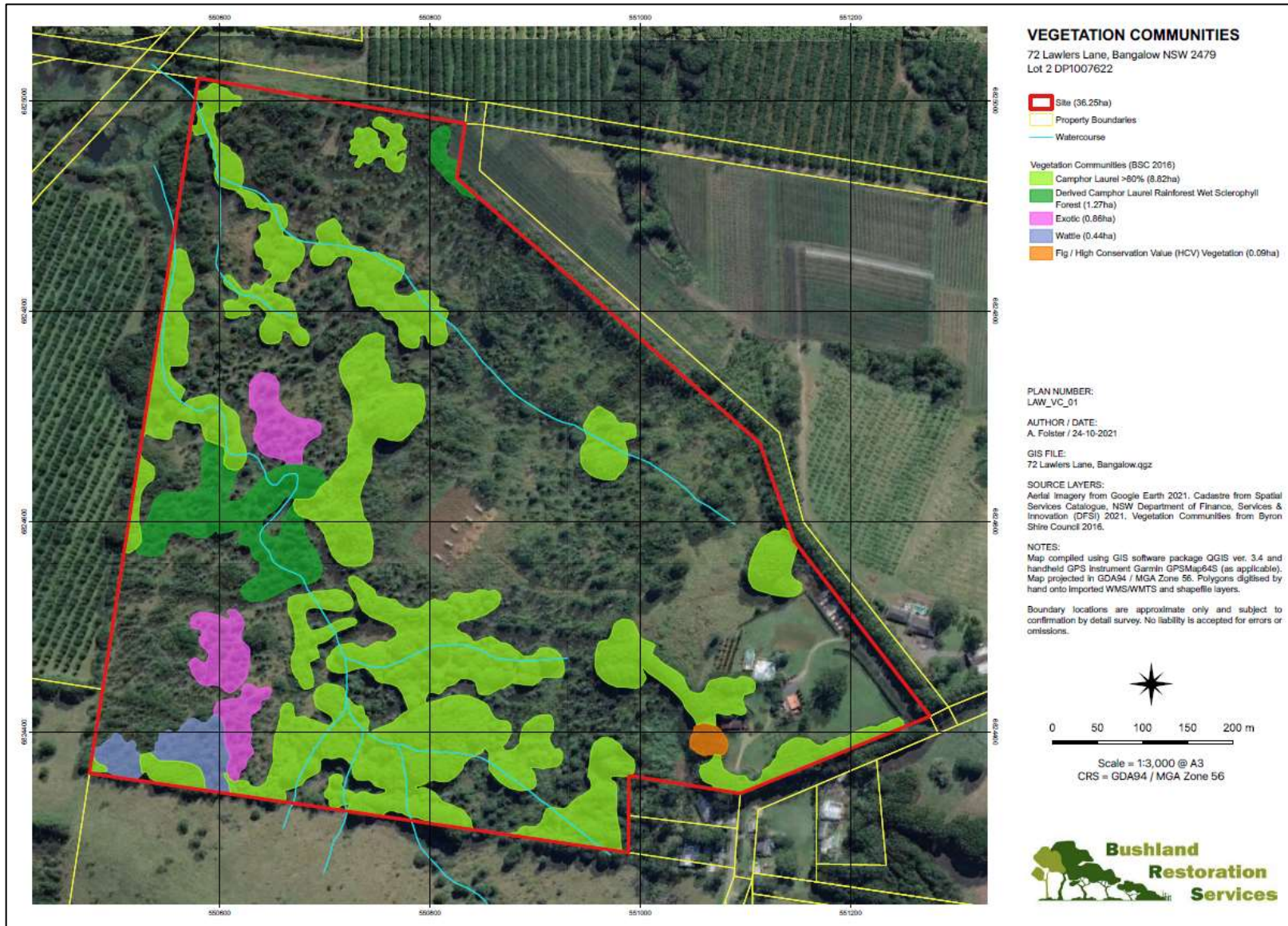


Figure 4: Vegetation communities on the property. Macadamia orchards surround the site on adjoining properties.



Plate 4: Camphor Laurel and Lantana predominate over much of the site.



Plate 5: Buddleia and Camphor Laurel are problematic adjoining the house site.

4.2 Exotic Vegetation / Weeds

Weed infestation levels are high across the site. Camphor Laurel harvest was undertaken in 2015 for the co-generation project, without subsequent control. This has resulted in extensive Camphor seedlings and saplings germinating, as well as resprouting of the larger trees. The major weed species in each stratum are listed in **Table 5** above. A full list of weeds encountered during site survey is contained in **Appendix 2**.

Biosecurity Act (NSW) 2015

The *Biosecurity Act 2015* has repealed the *Noxious Weeds Act 1993* which provided regulatory controls and powers to manage noxious weeds in NSW. The new Act 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 new 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 2017-2022

The *North Coast Regional Strategic Weed Management Plan 2017-2022*, 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 on the site within Restoration Zones 1 and 2 during field survey are listed in **Table 6** alongside the applicable management category stipulated in the *North Coast Regional Strategic Weed Management Plan 2017- 2022*. The weed control strategy and methods for the removal of these priority weeds are detailed in Section 6 of this plan.

Table 6 – 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
African Olive	<i>Olea europaea</i>					R
Broad-leaf Pepper	<i>Schinus terebinthifolius</i>			R		
Camphor Laurel	<i>Cinnamomum camphora</i>				R	
Cocos Palm	<i>Syagrus romanzoffiana</i>				R	
Coral Berry	<i>Ardisia crenata</i>				R	
Crofton Weed	<i>Ageratina adenophora</i>				R	
Fireweed	<i>Senecio madagascariensis</i>				S	
Groundsel Bush	<i>Baccharis halimifolia</i>			R		
Lantana	<i>Lantana camara</i>				S	
Passionfruit	<i>Passiflora spp.</i>				R	
Slash Pine	<i>Pinus elliotii</i>				R	
Umbrella Tree	<i>Schefflera actinophylla</i>				R	

Source: North Coast Regional Strategic Weed Management Plan 2017-2022.

5. VEGETATION RESTORATION STRATEGY

5.1 Restoration Approach

The rehabilitation strategy in this plan is derived from the common approaches described by Chenoweth & BRS (2012) in **Table 7**. 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 (**Figure 5**) has been used to guide the selection of a suitable ecological restoration approach for the vegetation management zone.

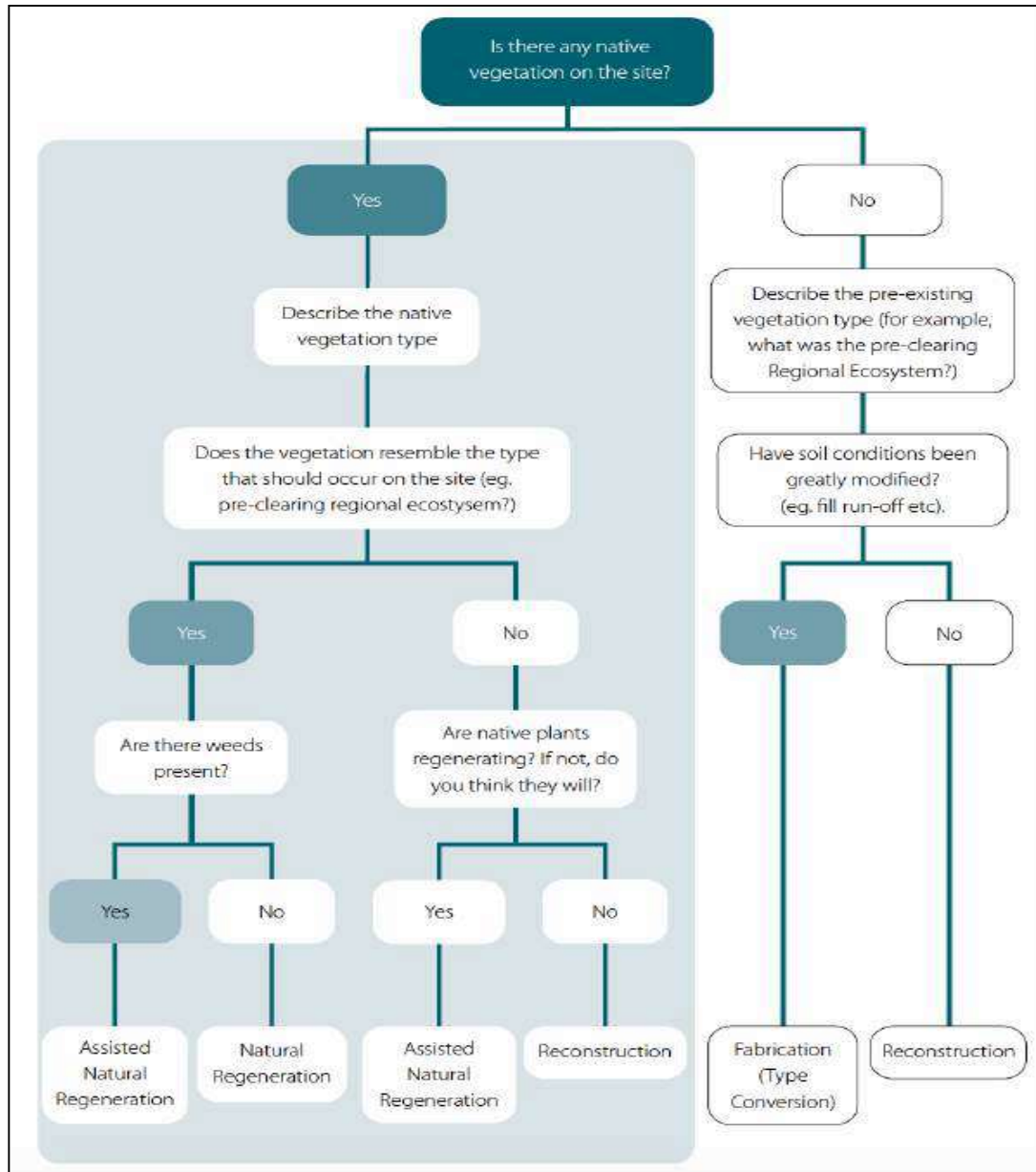


Figure 5 – Selection of restoration approach. Source: Chenoweth EPLA & BRS 2012.

Table 7 – 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.

Source: Chenoweth EPLA & BRS 2012.

5.2 Vegetation Management Area

This VMP applies to Lot 2 DP 1007622, outside of the proposed cabins and central cooking / amenities area and the designated house and shed envelopes. The vegetation management area subject to this plan has been chosen as the highest conservation value for initial works, being the headwaters of the small stream that runs into Byron Creek approximately 0.4km to the north-west of the site. The owner’s intention is to undertake ecological restoration over the whole of the remaining property in future, and such works should initially follow the main stream channel as a priority.

The vegetation management area subject to this Vegetation Management Plan been divided into two zones as shown below (see **Figure 6**). Vegetation management zones (VMZs) have been delineated by way of a combination of management objectives, restoration or maintenance requirements and level of threat.

The recommended restoration approach is to use a combination of assisted natural regeneration by systematically replacing weeds with native species and planting in larger canopy gaps where regeneration is unlikely to occur.

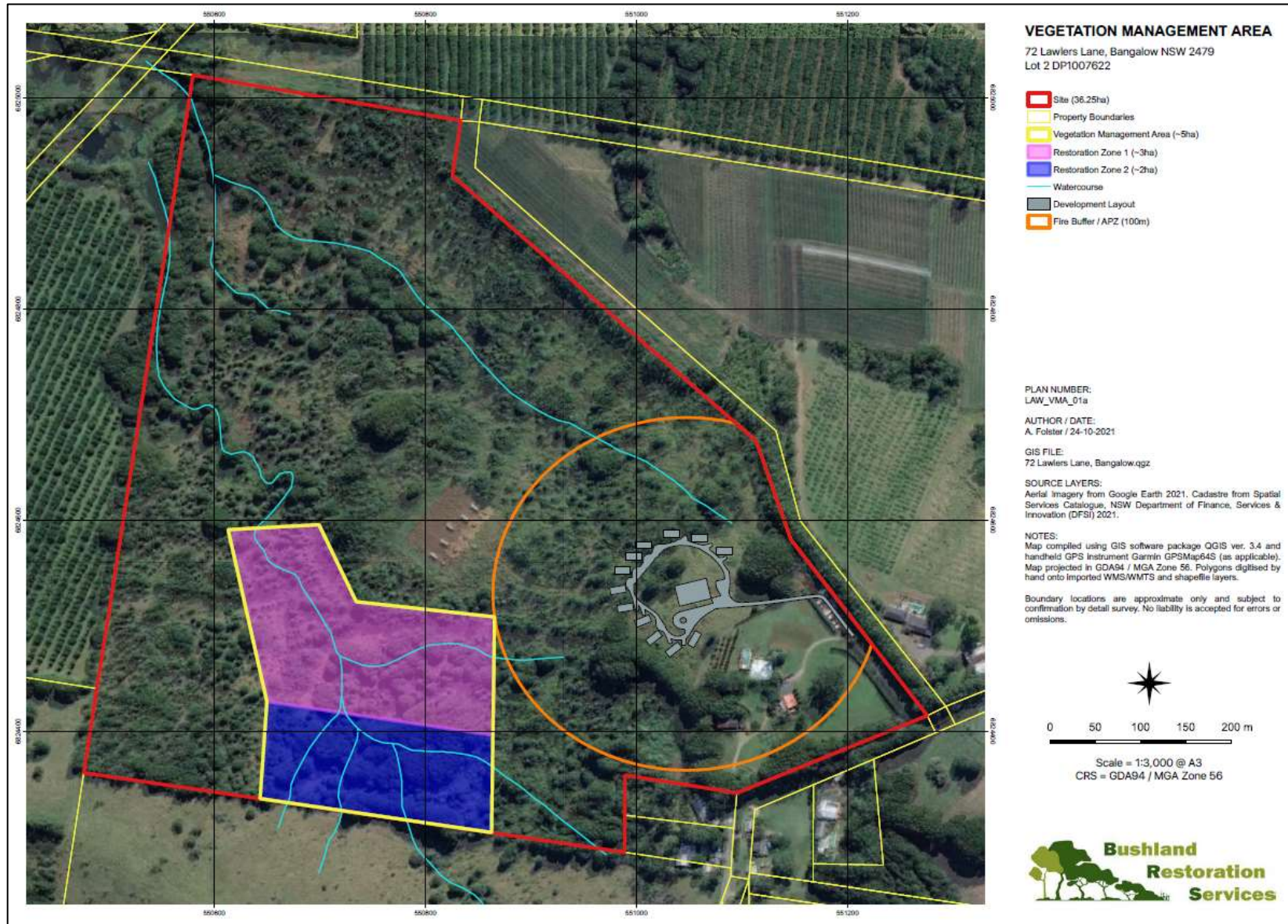


Figure 6: Vegetation Management Area to comply with VMP requirements for 12 cabins (5 hectares), and two Restoration Zones within the VMA

5.3 Restoration Zone 1 – Priority weed control – approx. 3ha

RZ 1 comprises the weedy headwaters of the ephemeral watercourse. This zone has been prioritised for works to control weeds and reduce the immediate threat of infiltration further into the site and downstream. The current threats are predominantly a result of Camphor Laurel harvest without control; previous agriculture, garden escapees from adjacent dwellings and orchards, and canopy gap infestations of Whisky Grass, Setaria, Mistflower and Crofton Weed.



Plate 6: The first-order drainage line contains the greatest native species diversity, while still very weedy.



Plate 7: Camphor Laurel and Privet dominate the zone

Methodology – weed control

Works to commence in the south-eastern section of the zone. Undertake weed control in the following sequence:

- Overspray the Buddleia and leave to drop leaves, then lop into billets and leave on the ground.
- Cut Morning Glory at head height, roll up the flexible stem. Cut at ground level and scrape and paint the base and exposed root system. Hang the rolled stem in the fork of a tree so that it does not resprout.
- Cut scrape and paint all small woody weeds such as Small and Large-leaved Privet, Lantana and Winter Senna, lop into billets and leave on the ground.
- Spot spray all ground cover weeds and woody weed seedlings throughout the zone.
- Drill and inject all larger Camphor Laurel, Slash Pine, Cocos Palm and Umbrella Trees.
- Follow up spot spray all resprouting woody and ground cover weeds. This will be required on a regular basis to ensure that weeds do not re-invade the zone.

At end of Year 1 assess the zone for natural recruitment. Consider planting if no recruitment or native seedlings.

5.4 Restoration Zone 2 –Weed control and gap planting – approx. 2ha

Methodology – weed control

Works to commence in the north-east corner of the zone. Undertake weed control as per Restoration Zone 1.

- Cut and paint Lantana, Privet, Senna and lop the stems into billets and leave on the ground.
- Blanket spray Whisky Grass and other exotic grasses and spray a 2m zone around existing vegetation edges to encourage recruitment to move outwards.
- Drill and inject the larger Camphor Laurels. Cut and paint saplings.
- Spot spray the Camphor and Privet seedlings and other groundcover weeds.
- Follow up spot spray all resprouting woody and groundcover weeds. This will be required on a regular basis to ensure that weeds do not re-invade the zone.

Methodology – gap planting

VMZ 2 contains proposed planting areas where open areas exist that are unlikely to be colonised by native species recruitment in the short to medium term. Four such gaps occur in RZ2, totalling approximately 2000m². Trees to be planted at 1.5m spacings, with a total of 800 trees to be planted.

It is a requirement that any native vegetation planted on site is to be certified by the supplier as being of local provenance.

Planting sequence:

1. Source 800 plants from local native plant nursery.
2. Site preparation to be carried out during the weed control works in VMZ 2.
3. Auger holes on same day as planting in the prepared site.
4. Plants to be soaked in Seasol prior to planting.
5. Plant, water, mulch and fertilise plants. Ideally plant during light rain.
6. Install solid plastic tree guards supported by two hardwood stakes (if required).
7. Maintain the planting with regular weed control to ensure that plants are not impacted by weeds. Planting may require watering if dry conditions persist.
8. Plant a mixture of the species below in each of the four gaps.
9. Follow up weed control on regular basis.
10. Replace plants if required.

5.5 Planting Species Lists

Table 8: Planting list – RZ2 canopy gaps

Scientific Name	Common Name	Numbers
<i>Acacia melanoxylon</i>	Blackwood	80
<i>Acmena smithii</i>	Lilly Pilly	80
<i>Alphitonia exelsa</i>	Red Ash	80
<i>Commersonia bartramia</i>	Brown Kurrajong	80
<i>Cupaniopsis anacardioides</i>	Tuckeroo	80
<i>Jagera pseudorhus</i>	Foam Bark	80
<i>Glochidion ferdinandi</i>	Cheese Tree	80
<i>Guioa semiglauca</i>	Guioa	80
<i>Melicope elleryana</i>	Pink Euodia	80
<i>Polyscias elegans</i>	Celery Wood	80
Total		800



Plate 8: Whisky Grass dominates this canopy gap.

6. IMPLEMENTATION MEASURES

6.1 Schedule of Works

This plan specifies a five (5) year duration for the weed control program (**Table 9**) comprising primary weed control and planting (Year 1), then follow-up weed control (Year 2 & 3) followed by site maintenance (Year 4 & 5).

Table 9 – Five (5) year implementation schedule for weed control works associated with the development.

Year	Activity
1	<ul style="list-style-type: none"> ▪ Two (2) 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 restoration zones 1 and 2, and site preparation for planting in Zone 2. ▪ Planting in Zone 2 Subtropical Rainforest pioneer species. ▪ Follow up weed control in all vegetation management zones every 2 months or as required. ▪ Repeat photo point monitoring at the end of Year 1. ▪ Submit annual progress report with monitoring results to Byron Shire Council.
2 & 3	<ul style="list-style-type: none"> ▪ 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 Byron Shire Council.
4 & 5	<ul style="list-style-type: none"> ▪ 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 Byron Shire Council.

6.2 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 site. 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 3**.

6.3 Activities Not Permitted in Vegetation Management Zones

The vegetation management zone nominated in this plan must be protected from damage or unauthorised encroachment for the duration of the 5-year restoration program. Activities not permitted therein include, but are not limited to, the following:

- Clearing, lopping or removal of any native plants, whether existing at the date of the approval or planted pursuant to conditions of development consent.
- Erection of any fixtures or improvements, including buildings, structures or service infrastructure either above or below the existing natural ground surface.
- Depositing of any fill, soil, rock, rubbish, ashes, garbage, waste or other foreign material.

7. GENERAL GUIDELINES

7.1 Bush Regenerators

On ground weed control works and maintenance must be undertaken by qualified bush regenerators holding TAFE Conservation & Land Management Certificate 3 (and supervisor holding CLM Certificate 4) or equivalent and with minimum 3 years' experience working in local rainforest 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 site maintenance program.

Supervising bush regenerators 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.

7.2 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*.

7.3 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 approved by Byron Shire Council need to ensure they have submitted and adhere to an approved current Work Health and Safety System as per Council requirements.

8. MONITORING AND REPORTING

8.1 *Monitoring Requirements*

The 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.

Two photo-points to be set up within VMZ 1 and 2 and one photo-point each for the planting areas (the areas where work takes place) and marked with pink flagging tape. The photo-point locations are to be recorded using a handheld GPS, point coordinates recorded in the work diary or Daily Record Sheet and marked on a map of the site.

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 the day each time.
- The compass orientation of each photo to be noted.
- The camera lens, angle and height to be the same for each photo.

For each photo-point 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 (%).
- In planting areas record mean survival rate and growth rate of plants.

Monitoring of KPIs and repeat photographs to be undertaken on an annual basis. Adaptive management may be required as a recommendation after monitoring.

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

Effective monitoring and evaluation of relevant vegetation attributes provides evidence that agreed project objectives and outputs are being delivered. It also assists in implementing site-specific adaptive management approaches. Effective monitoring and evaluation rely on consistent comparisons between quality baseline data and data collected at regular intervals during the progression of on- ground works.

8.2 *Performance Indicators*

The monitoring program which measures performance indicators (**Table 10**) has been designed to gauge the progressive success of the program and allow for the early detection of risk factors that may impede the achievement of project objectives. This provides an opportunity for adaptive management and improves the chances of success for the project.

Table 10 Performance Indicators

Planted stock to achieve 90% survival rate at completion of year one.
Primary treatment of all weeds in the vegetation management zone to achieve environmental weed cover of less than 10% ground cover and less than 5% shrub and tree layer species at completion of year two.
During years 3-5 (maintenance period) environmental weeds are to be progressively treated to ensure no weeds are present at completion of year five.
Growth of planted tree stock to achieve 1m growth by year three.
Growth of planted tree stock to achieve 1.5 m by year five.
Growth of planted tree stock to achieve cumulative cover of 80% by year five.
Planting stock to achieve a survival rate of 90 % by year 5.
During the establishment and maintenance period increased recruitment of native species and increased percentage cover of native species to be achieved.

Table 11 – Summary of Performance Indicators for each vegetation management zone.

Restoration Zone	Performance Indicator	Timing	Responsibility
RZ 1 and 2	<ul style="list-style-type: none"> ▪ Retained vegetation adequately protected with no encroachments. ▪ Weed cover reduced to <10% in all vegetation strata. ▪ Weed cover reduced to 5% in all vegetation strata ▪ Weed cover reduced to <5% in all vegetation strata. ▪ Increase in natural plant recruitment compared to previous year. 	Annual Year 1 Year 2 Year 3-5 Annual	Owner / Bush Regeneration Contractor
RZ 2 – canopy gaps	<ul style="list-style-type: none"> ▪ Rainforest plantings (800 stems) healthy / established with 100% survivorship @ approx. 1 native plant per 2m². ▪ Tree plantings to achieve average growth of 1-1.5m and 80% cumulative vegetation cover by Year 5. 	Year 2 Annual	

8.3 Reporting

The bush regeneration contractor undertaking the weed control works to provide an annual progress report to Byron 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 the 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 site.

8.4 Adaptive Management

A key factor for project success will be the ability of those implementing the plan to respond to changing site 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 site 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 Byron Shire Council.

9. REFERENCES

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APPENDIX 1 – Native Flora Species List

Scientific name	Common name
<i>Acacia melanoxylon</i>	Blackwood
<i>Alocasia brisbanensis</i>	Cunjevoi
<i>Alphitonia excelsa</i>	Red Ash
<i>Alpinia caerulea</i>	Native Ginger
<i>Archontophoenix cunninghamiana</i>	Bangalow Palm
<i>Asplenium australasicum</i>	Bird's-nest Fern
<i>Blechnum cartilagineum</i>	Gristle Fern
<i>Calochlaena dubia</i>	Common Ground Fern
<i>Centella asiatica</i>	Gotu Cola
<i>Cissus antarctica</i>	Water Vine
<i>Commelina cyanea</i>	Scurvy Weed
<i>Commersonia bartramia</i>	Brown Kurrajong
<i>Cordyline petiolaris</i>	Palm Lily
<i>Cryptocarya microneura</i>	Murrogun
<i>Cryptocarya obovata</i>	Pepperberry
<i>Cupaniopsis anacardioides</i>	Tuckeroo
<i>Cyathea leichhardtiana</i>	Prickly Tree fern
<i>Cyperus gracilis</i>	Slender Flat-sedge
<i>Dianella caerulea var caerulea</i>	Blue Flax Lily
<i>Dichondria repens</i>	Kidney Weed
<i>Elaeocarpus obovatus</i>	Hard Quandong
<i>Elaeodendron australe var. integrifolium</i>	Narrow-leaved Red Olive Plum
<i>Ficus fraseri</i>	Sandpaper Fig
<i>Ficus obliqua</i>	Small-leaved Fig
<i>Grevillea robusta</i>	Silky Oak
<i>Guioa semiglauca</i>	Guioa
<i>Hibbertia scandens</i>	Guinea Flower
<i>Lomandra longifolia</i>	Mat Rush
<i>Jagera pseudorhus</i>	Foam Bark
<i>Macaranga tanarius</i>	Macaranga
<i>Maclura cochinchinensis</i>	Cockspur
<i>Melicope elleryana</i>	Pink Euodia
<i>Notelaea longifolia forma glabra</i>	Large Mock-Olive
<i>Parsonsia straminea</i>	Common Silkpod
<i>Pittosporum undulatum</i>	Sweet Pittosporum

APPENDIX 2 – Weed Species List

Scientific Name	Common Name
<i>Ageratina adenophora</i>	Crofton Weed
<i>Ageratina riparia</i>	Mistflower
<i>Ageratum houstonianum</i>	Blue Billygoat Weed
<i>Ambrosia artemisiifolia</i>	Annual Ragweed
<i>Andropogon virginicus</i>	Whiskey Grass
<i>Ardisia crenata</i>	Coral Berry
<i>Baccharis halimifolia</i>	Groundsel Bush
<i>Bidens pilosa</i>	Cobbler's Pegs
<i>Buddleia sp.</i>	Butterfly Bush
<i>Cinnamomum camphora</i>	Camphor Laurel
<i>Hedychium gardnerianum</i>	Ginger Lily
<i>Hypochoeris radicata</i>	Flatweed
<i>Ipomea indica</i>	Morning Glory
<i>Lantana camara</i>	Lantana
<i>Ligustrum lucidum</i>	Large-leaved privet
<i>Ligustrum sinense</i>	Small-leaved Privet
<i>Melinis repens</i>	Red Natal Grass
<i>Nephrolepis cordifolia</i>	Fishbone Fern
<i>Ochna serrulata</i>	Ochna
<i>Olea europaea subsp. cuspidata</i>	African Olive
<i>Paspalum mandiocanum</i>	Broad-leaved Paspalum
<i>Passiflora edulis</i>	Edible Passionfruit
<i>Passiflora suberosa</i>	Corky Passionflower
<i>Pennisetum purpureum</i>	Bana Grass
<i>Pinus elliottii</i>	Slash Pine
<i>Schefflera actinophylla</i>	Umbrella Tree
<i>Schinus terebinthifolius</i>	Broad-leaved Pepper Tree
<i>Senecio madagascariensis</i>	Fireweed
<i>Senna pendula var. glabrata</i>	Senna
<i>Solanum capsicoides</i>	Devil's Apple
<i>Solanum mauritanium</i>	Tobacco Bush
<i>Stenotaphrum secundatum</i>	Buffalo Grass
<i>Syagrus romanzoffiana</i>	Cocos Palm
<i>Viburnum odoratissimum</i>	Sweet Viburnum

APPENDIX 3 – Weed Control Methods

"Cut-scrape-paint" method: This method applies to all woody shrubs, trees and some vines e.g. Camphor laurel, 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 1.5 cms. 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.

Stem Injection: This method applies to all woody trees and shrubs with a stem diameter >6 cms, e.g. Camphor Laurel trees.

- (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: 0.5).
- (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 marker dye. 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 that may 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: For Lantana, the usual dilution rate is glyphosate 1:75 water; for exotic grasses glyphosate 1:100 water.
- 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 may be 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.