

Ecological Assessment and Vegetation Management Plan

for a proposed

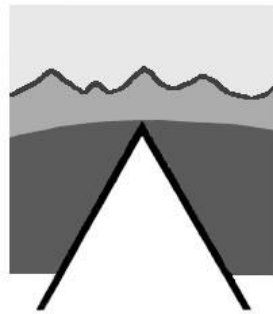
Multiple Occupancy 'The Midlands'

at

16 Whian Road, Eureka

Lot 25 DP 1102773

by



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**16 Whian Road, Eureka – Proposed Multiple Occupancy
Ecological Assessment and Vegetation Management Plan**



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DOCUMENT CONTROL

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EXECUTIVE SUMMARY

An Ecological Assessment and Vegetation Management Plan (VMP) has been commissioned by the owners of the property at 16 Whian Road, Eureka to accompany a development application for a proposed Multiple Occupancy (multiple occupancy) for 14 dwelling sites and associated infrastructure. This report will guide and direct environmental protection and enhancement works on the subject site as required by Byron Shire Council as part of the proposal. The VMP plan also includes vegetation buffer plantings required by the Land Use Conflict Risk Assessment.

The assessment of existing ecological values on the site forms part of the site environmental assessment for the proposed Multiple Occupancy and also provides a baseline for the proposed enhancement works. The ecological works outlined within the Vegetation Management Plan are a key component of the proposal consisting of 14 dwelling sites and associated infrastructure, as demonstrated in the submitted Statement of Environmental Effects report and attached illustrations and assessments.

At a rate of 900 tree plantings per dwelling, the proposal requires 12,600 rainforest plantings, or equivalent environmental works as bush regeneration, to be undertaken on the site within designated management zones.

This report comprises a comprehensive analysis of the environmental features and current ecological status of the property including a detailed map of existing vegetation communities on the site. The report details the 5-year ecological works schedule and associated monitoring and reporting procedures in accordance with Byron Shire Council guidelines. The proposal will be undertaken in three stages, including the VMP works.

The existing property is a large rural land holding located on the northern side of Whian Road and Federal Drive. The site currently contains beef cattle grazing grasslands and areas of regrowth vegetation dominated by exotic grasses with some areas of regrowth vegetation in the northern gully along with scattered paddock trees. The site has been modified by large-scale clearing following settlement and the establishment of agriculture in the late 1800s / early 1900s within the Eureka locality.

The proposed Multiple Occupancy provides an excellent opportunity to undertake beneficial ecological works with the increased availability of human resources, financial capacity and the implementation of a mixed land use development for the property.

Numerous ecosystem services may be delivered to the Byron Shire through the enactment of this VMP on the subject property, in particular the following:

- Improved downstream water quality;
- Enhanced air quality;
- Habitable micro-climate for native species;
- Protection of top soil for longevity; and
- Amenity values for well-being of occupants;

The following sections of this report demonstrate that the site contains some existing important ecological values, that are currently not subject to any significant ecological protection or enhancement program. The proposal results in positive environmental, social and economic outcomes for the site.

1. INTRODUCTION

This report constitutes an Ecological Assessment Report (EAR) and Vegetation Management Plan (VMP) to service of the statutory planning requirements of Byron Shire Council for a proposed Multiple Occupancy (Rural Landsharing Community) located at 16 Whian Road, Eureka described at Lot 25 DP 1102773 known as 'The Midlands'. The EAR considers potential impacts on existing ecological values on the subject site, while the VMP provides an ecological works plan as part of the proposed 14 multiple occupancy dwelling sites and land management.

This VMP is consistent with the *Byron Local Environmental Plan 2014 (LEP)*, the *Byron Development Control Plan 2014 (DCP)*, the *Byron Rural Settlement Strategy 1998 (BRSS)*, the *Byron Biodiversity Conservation Strategy 2004 (BBCS)* and *BSC VMP Guidelines (undated)*.

1.1 Report Overview

This report contains **three main sections** with attached appendices:

Section 1: INTRODUCTION

Section 2: ECOLOGICAL ASSESSMENT

Section 3: VEGETATION MANAGEMENT PLAN

Appendices

1.2 Aims and Objectives

The **aim** of this report is to:

Undertake a comprehensive ecological assessment of the site and develop a suitable management plan to be implemented for the proposed Multiple Occupancy, to undertake beneficial ecological works, meeting the requirements of Byron Shire Council's plans, strategies and guidelines.

The **objectives** of this VMP are:

- Conduct site surveys and map vegetation on the subject property including locating significant native flora and fauna, threatened species and communities, and environmental weeds;
- Plant 900 native trees or carry out equivalent ecological works per Multiple Occupancy dwelling site on the subject property;
- Manage environmental weeds on the property including the removal of Camphor Laurel within the riparian corridors;
- Protect and enhance the habitat of native species, in particular recognise threatened species and endangered ecological communities;
- Protect and enhance areas on the site containing environmental values such as HEV vegetation, as shown within Byron Shire Council environmental mapping;
- Improve water catchment values including vegetated riparian zones and drainage lines on the property within the Coopers Creek catchment;
- Minimise bushfire hazard risk to the proposed new MO dwelling sites;
- Improve the amenity and conservation value of the property by protecting and restoring biodiversity and ecological processes;
- Maintain agricultural and rural living values of the property and enhance the overall sustainability of multiple land uses;
- Achieve performance indicators after completing ecological works including the means to implement an adaptive management approach; and
- Monitor environmental repair and enhancement works with ongoing inspections and data collection for reporting to Byron Shire Council.

1.3 Methodology

1.3.1 Scope of Work

The *Byron Shire Development Control Plan 2014* requires that impacts on ecological values be considered for a proposed multiple occupancy, and that the concept includes environmental enhancement works, to be conducted on the property as a part of the mixed land use land management objectives. Extracts from the Byron DCP 2014 are shown in Appendix A.

1.3.2 Field Surveys

An experienced ecologist undertook multiple land and vegetation surveys on the subject site over an extended period of time between 2019 and 2021. The vegetation surveys were used to locate, identify, and record native and exotic plant species on the subject site and also to identify suitable locations for targeted environmental works. The surveys involved walking along meandering transects, edge inspection, field identification, and collecting samples and photographs. The locations of the proposed new dwellings, asset protection zones and associated infrastructure sites were also comprehensively surveyed.

1.3.3 Ecological Data

Ecological data was utilised that included threatened flora and fauna species mapping from the *NSW BioNet Atlas* (<http://www.bionet.nsw.gov.au/>). A potential threatened species list was extracted from recorded flora and fauna inside a 10 x 10 km grid square with the site positioned at the centroid. The threatened species list was utilised during site surveys for the detection of threatened species on the site.

1.3.4 Environmental Mapping

Maps were created for the purposes of the assessment and management plan, that were developed utilising spatial data obtained from the NSW Office of Environment and Heritage and NSW Land and Property Information, Spatial Services. Vegetation and environmental values mapping were sourced from Byron Shire Council. Vegetation data, topographic data, aerial photography and on-site surveys were used in the generation and application of this VMP.

1.4 Relevant Legislation

1.4.1 Biodiversity Conservation Act 2016

The ***NSW Biodiversity Conservation Act 2016*** commenced on 25 August 2017.

The purpose of this Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development (described in section 6 (2) of the Protection of the Environment Administration Act 1991), and in particular:

- (a) to conserve biodiversity at bioregional and State scales, and
- (b) to maintain the diversity and quality of ecosystems and enhance their capacity to adapt to change and provide for the needs of future generations, and
- (c) to improve, share and use knowledge, including local and traditional Aboriginal ecological knowledge, about biodiversity conservation, and
- (d) to support biodiversity conservation in the context of a changing climate, and
- (e) to support collating and sharing data, and monitoring and reporting on the status of biodiversity and the effectiveness of conservation actions, and
- (f) to assess the extinction risk of species and ecological communities, and identify key threatening processes, through an independent and rigorous scientific process, and
- (g) to regulate human interactions with wildlife by applying a risk-based approach, and
- (h) to support conservation and threat abatement action to slow the rate of biodiversity loss and conserve threatened species and ecological communities in nature, and
- (i) to support and guide prioritised and strategic investment in biodiversity conservation, and

- (j) to encourage and enable landholders to enter into voluntary agreements over land for the conservation of biodiversity, and
- (k) to establish a framework to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity, and
- (l) to establish a scientific method for assessing the likely impacts on biodiversity values of proposed development and land use change, for calculating measures to offset those impacts and for assessing improvements in biodiversity values, and
- (m) to establish market-based conservation mechanisms through which the biodiversity impacts of development and land use change can be offset at landscape and site scales, and
- (n) to support public consultation and participation in biodiversity conservation and decision-making about biodiversity conservation, and
- (o) to make expert advice and knowledge available to assist the Minister in the administration of this Act.

The VMP attempts to align with all relevant objectives of the BC Act 2016. Incoming occupants of the Multiple Occupancy should be familiar with relevant sections of the BC Act 2016 regarding management of the overall property.

1.4.2 NSW Biosecurity Act 2015

The *North Coast Strategic Weed Management Plan 2017-2022* provides a framework for weed management in the North Coast region (NSW). One of the key aspects is that it identifies regional priority weeds that pose a significant risk and outlines responses to achieve weed management outcomes, which also supports the *NSW Biosecurity Act 2015*. The priority weeds for the region are set out in the plan, with additional information provided on the NSW DPI website and the NSW WeedWise application.

Weed species have been prioritised by the NSW Weed Risk Management system, guided by the principle '*managing weeds earlier rather than later is more cost effective*', in accordance with weed management hierarchy; Prevention, Eradication, Containment and Asset Protection (see Table 1 below). Weed risk is calculated by analysis of a species' invasiveness, environmental impacts, potential distribution and also for control costs, persistence in the environment and current distribution. Further information on specific weeds on the site are provided in following sections of this report.

Table 1: Regional weed management categories

Category	Objective	Characteristics of weeds in this category
Prevention	To prevent the weed species arriving and establishing in the Region.	These species are not known to be present in the region. They have a high to very high weed risk (highly invasive and high threat) and have a high likelihood of arriving in the region due to potential distribution and/ or an existing high-risk pathway.
Eradication	To permanently remove the species and its propagules from the Region. OR to destroy infestations to reduce the extent of the weed in the region with the aim of local eradication.	These species are present in the region to a limited extent only and the risk of re-invasion is either minimal or can be easily managed. They have a high to very high weed risk and high feasibility of coordinated control.
Containment	To prevent the ongoing spread of the species in all or part of the Region.	These species have a limited distribution in the region. Regional containment strategies aim to prevent spread of the weed from an invaded part of the region (core infestation), and/or exclude the weed from an uninvaded part of the region (exclusion zone).
Asset Protection	To prevent the spread of weeds to key sites/ assets of high economic, environmental and social value, or to reduce their impact on these sites if spread has already occurred.	These weed species are widespread and unlikely to be eradicated or contained within the wider regional context. Effort is focussed on reducing weed threats to protect priority high value assets.

2. ECOLOGICAL ASSESSMENT

2.1 Property Location and Description

The subject site for the proposal is addressed at 16 Whian Road, Eureka legally described as Lot 22 DP 1102773. The property is located within the Byron Shire approximately 8 km northwest of Bangalow and 17 km southwest of Byron Bay (Figure 1). The immediate locality of the site contains a mix of land uses including rural living, horticulture, grazing, other small-scale agriculture and multiple occupancy & community title properties (see Figure 2).



Figure 1: Site location within Byron Shire (Source: SIX Maps, NSW LPI)

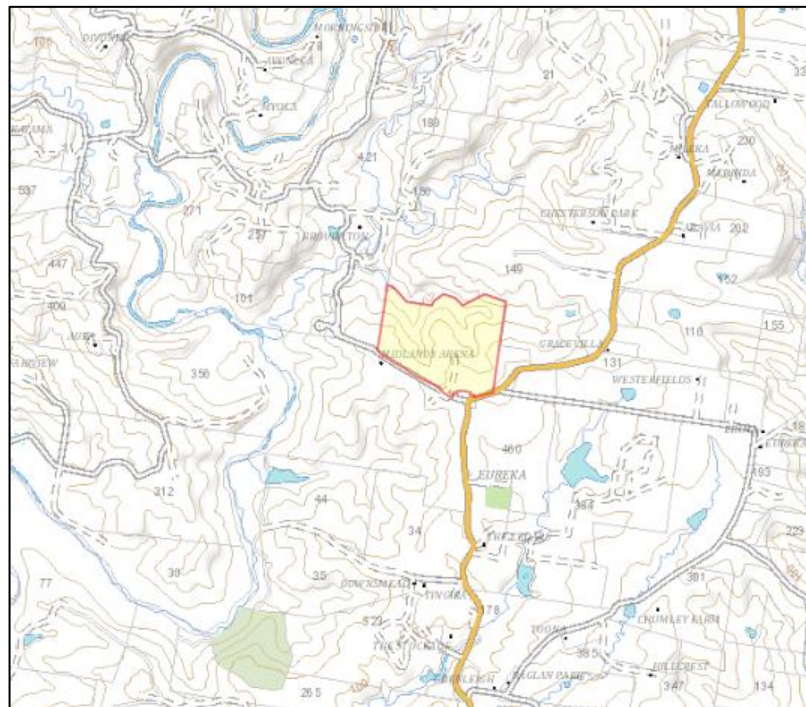


Figure 2: Site locality (Source: SIX Maps, NSW LPI)

The large rural property has frontage to Whian Road and Federal Drive on its southern boundary and covers a total area of 42.1 hectares (see Figure 3).

The subject site is zoned under the Byron LEP 2014 (see Figure 4) as follows:

- Zone RU1 – Primary Production
- Zone RU2 – Rural Landscape
- Two areas of DM – Deferred Matter



Figure 3: Subject site (Source: NSW Six Maps)

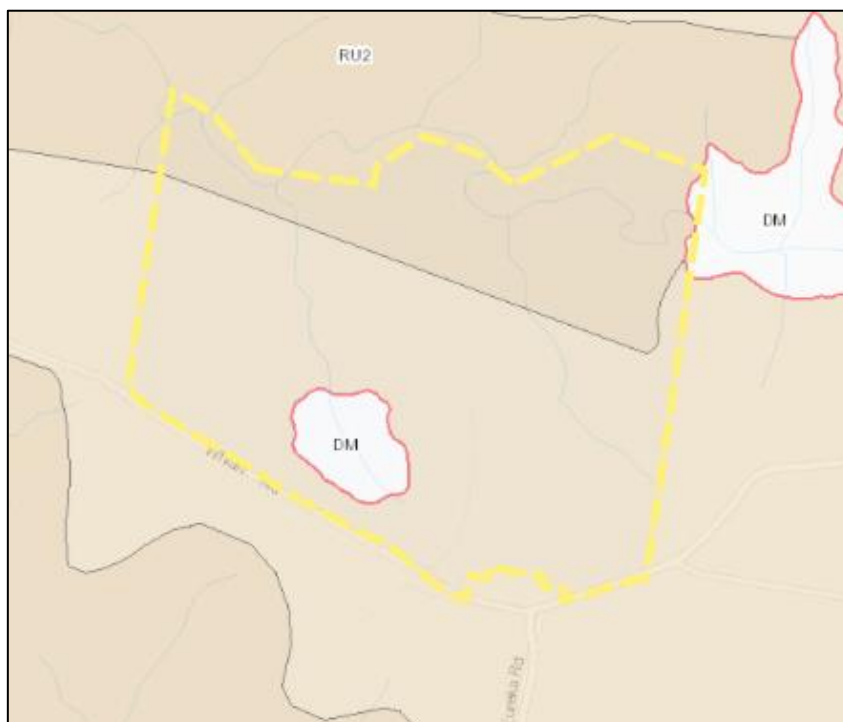


Figure 4: Byron LEP Zoning (Source: Byron Shire Council)

2.2 The Proposed Development and Land Use

The property is currently used solely for beef cattle farming, with much of the site covered in grazing grasslands, while there is currently no existing dwelling or other farm buildings on the site.

The proposed development application is for a Multiple Occupancy that comprises fourteen (14) dwelling sites, associated infrastructure, land management and ecological enhancement. The proposal intends to retain some areas on the site for agricultural land use with two MO dwelling dedicated as farm residences. The remaining dwelling sites are dedicated to village living and rural living.

The proposed Multiple Occupancy contains the following components:

- Cluster Village A – four dwelling sites
- Cluster Village B – five dwelling sites including an agricultural residence
- Cluster Rural Living C – four dwelling sites
- Agricultural residence – one dwelling site
- Associated infrastructure including vehicular access, on-site services and bushfire management
- Land management plans including the Land Use Conflict Risk Assessment
- Vegetation management plan including allocated environmental works

The below illustration (Figure 5) depicts the layout of the proposed Multiple Occupancy at 16 Whian Road, Eureka:



Figure 5: Multiple Occupancy Proposed Layout

2.3 Physical Characteristics

2.3.1 Climate

The Cape Byron Lighthouse is the closest official weather station with long term data and is located approximately 25 km to the east of the site. Appendix B contains relevant information sourced from the Bureau of Meteorology records, including mean maximum temperature, mean minimum temperature, mean rainfall and mean number of wet days.

The site experiences a sub-tropical climate, with seasonal variations in temperature and rainfall that should be taken into account when undertaking ecological works. The property receives a high annual average rainfall ($\pm 1500\text{mm}$), with the most reliable months being February – May and least reliable months being July – October.

Frost can occur during the winter months in certain locations on the site, in particular within the lower northern gullies.

Minor flooding does occur along the small creeks on the site and may be an issue for tree plantings within riparian zones along streams and gullies.

Australia's major climate drivers—the El Niño–Southern Oscillation (ENSO) and the Indian Ocean Dipole (IOD) are used by the Australian Bureau of Meteorology to provide seasonal forecasts and should be used to help with planning on-site environmental works.

The following graphic (Figure 6) depicts the annual climate averages in a graph format:

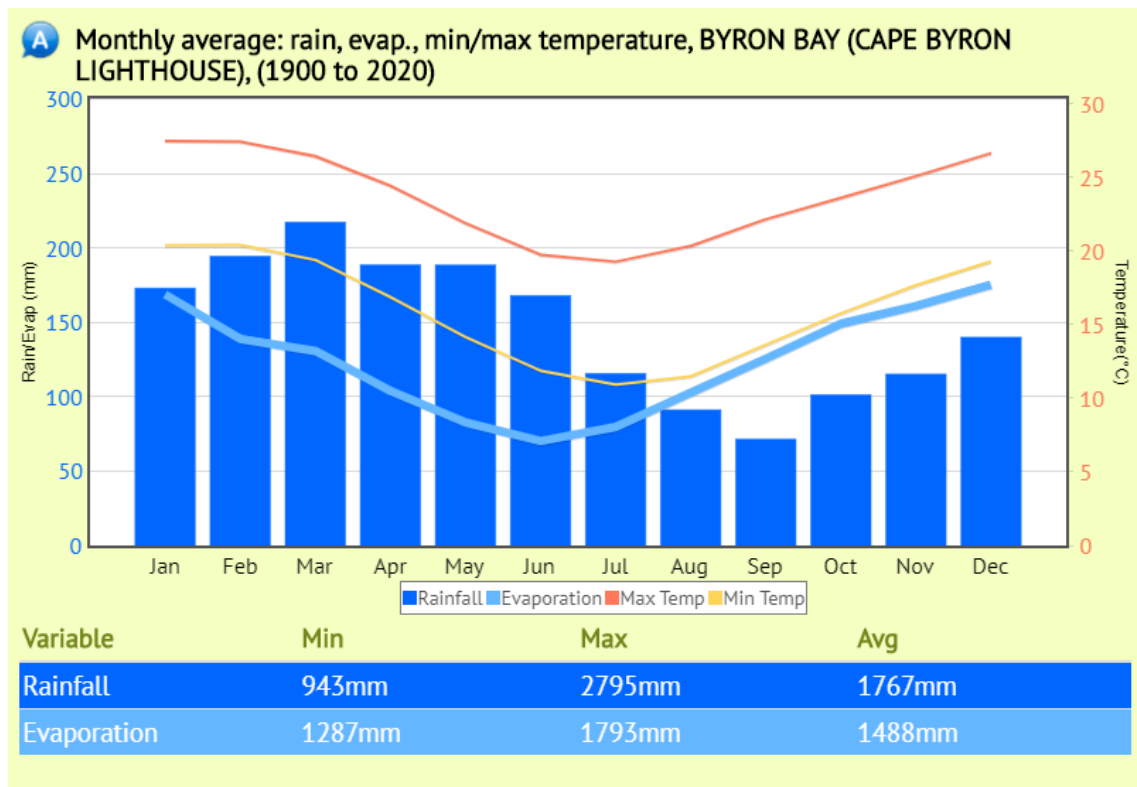


Figure 6: Summary of climate data (Source: Climate Australia)

2.3.2 Topography

The property comprises undulating land, that spans from Whian Road and Federal Drive in the south to a main east-west gully containing a permanent unnamed creek along the northern boundary. The property generally slopes away from the southern boundary, at approximately 170-195m AHD to the northern boundary at approximately 40-80m AHD. The property contains two prominent north-south gullies with ephemeral watercourses that flow in a north to north-west direction towards the northern gully.

The following map extract from NSW Topographical maps shows the topographical and drainage details of the site (Figure 7).

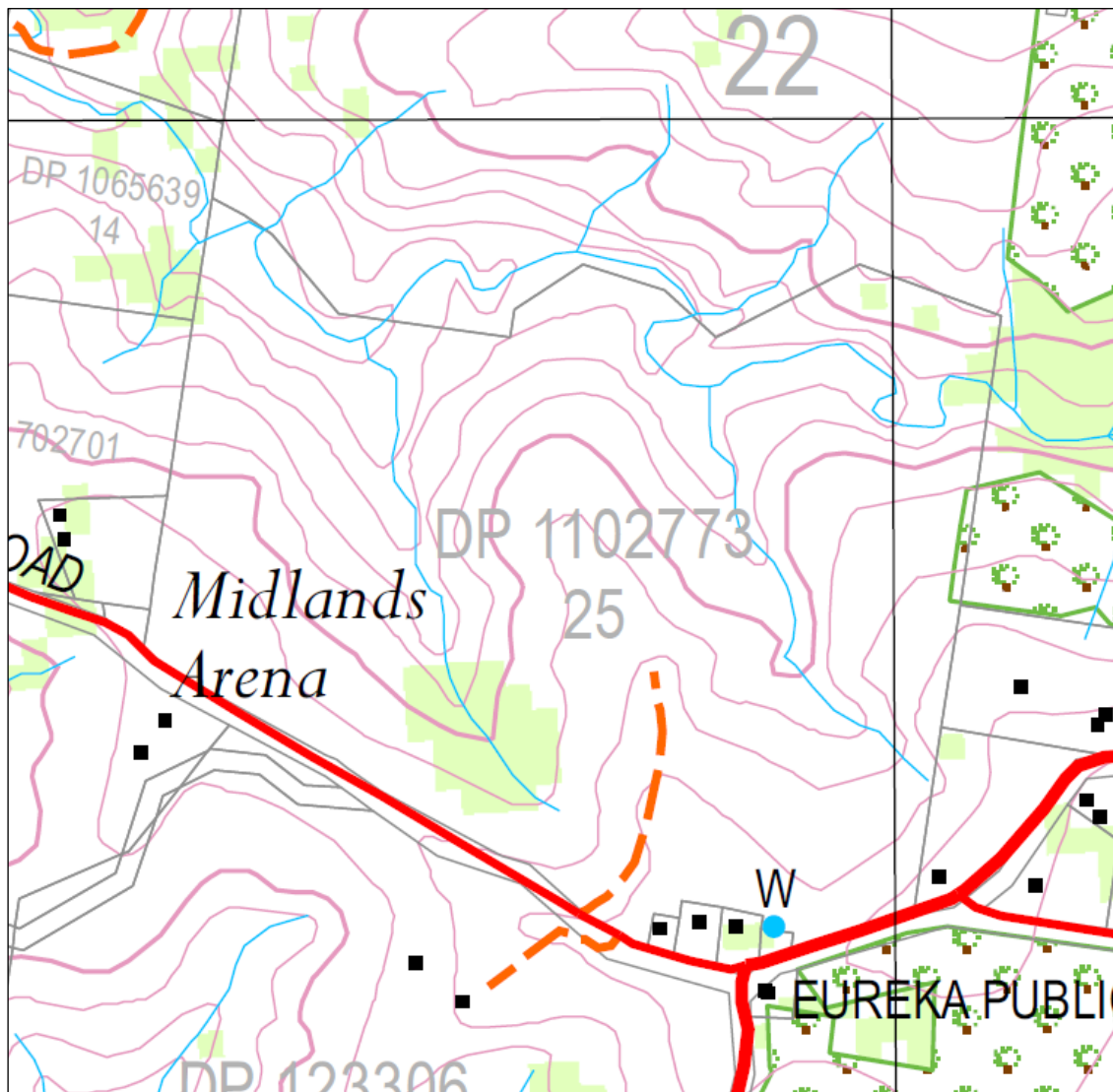


Figure 7: Site topography & drainage

2.3.3 Geology and Soils

The geology at the site of the proposal, according to ‘NSW Tweed Heads 1:100,000 Quaternary Geology’ mapping, consists of:

Tv – Tertiary volcanic rocks: basalt, rhyolite, trachyte, gabbro, syenite

The site assessment showed a dominance of red krasnozems which is consistent with published works by D. Morand titled ‘Soil Landscapes of the Lismore – Ballina 1:100 000 Sheet’ (Table 1, Figure 8).

Table 2: Soil Landscape

Grouping	ROSEBANK	WOLLONGBAR
Soil Landscape	rolling low hills and hills on Lismore Basalts. Relief 70–100 m, slopes 20–40%. Ridges and crests are convex and moderately broad (100–300 m). Ridge slopes, sideslopes and isolated hills are common. Extensively cleared closed native forest, now predominantly sod grassland with large areas of closed camphor laurel forest.	very low to low gently undulating to rolling rises and hills on plateau surfaces of the Lismore Basalts. Slopes 3–15% and relief generally 30–60 m. Altitude 140–200 m. Extensively cleared closed-forest (“Big Scrub”).
Soil Description	Shallow (<100 cm), well drained Krasnozems and brownish red Krasnozems (Gn3.11, Gn4.11, Uf5.21, Uf5.2, Uf6) on crest margins. Moderately deep to deep (>100 cm) Krasnozems and brownish red well-drained Krasnozems (Gn3.11, Gn4.11, Uf5.21, Uf5.2, Uf6) on slopes.	Mostly deep (>200 cm), well-drained Krasnozems (Gn3.11, Gn4.11, Uf5.22) with shallower (80 - 150 cm), stonier Krasnozems (Gn3.11, Gn4.11, Uf5.22) on crest/upper slope boundaries. Wet alluvial Krasnozems (Uf5, Uf6) in drainage lines.

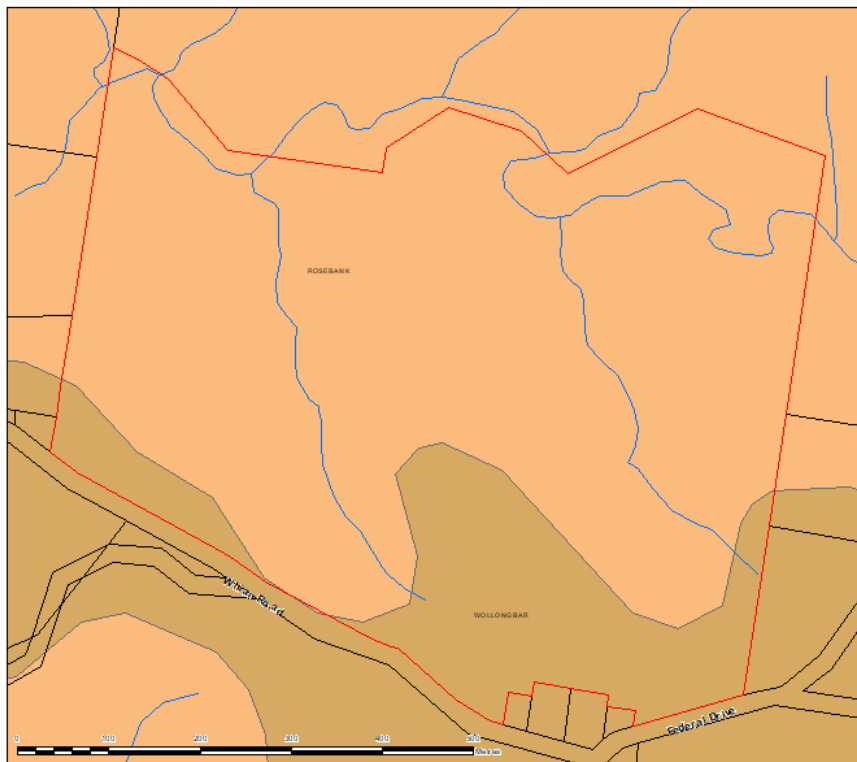


Figure 8: Morand soil classification map

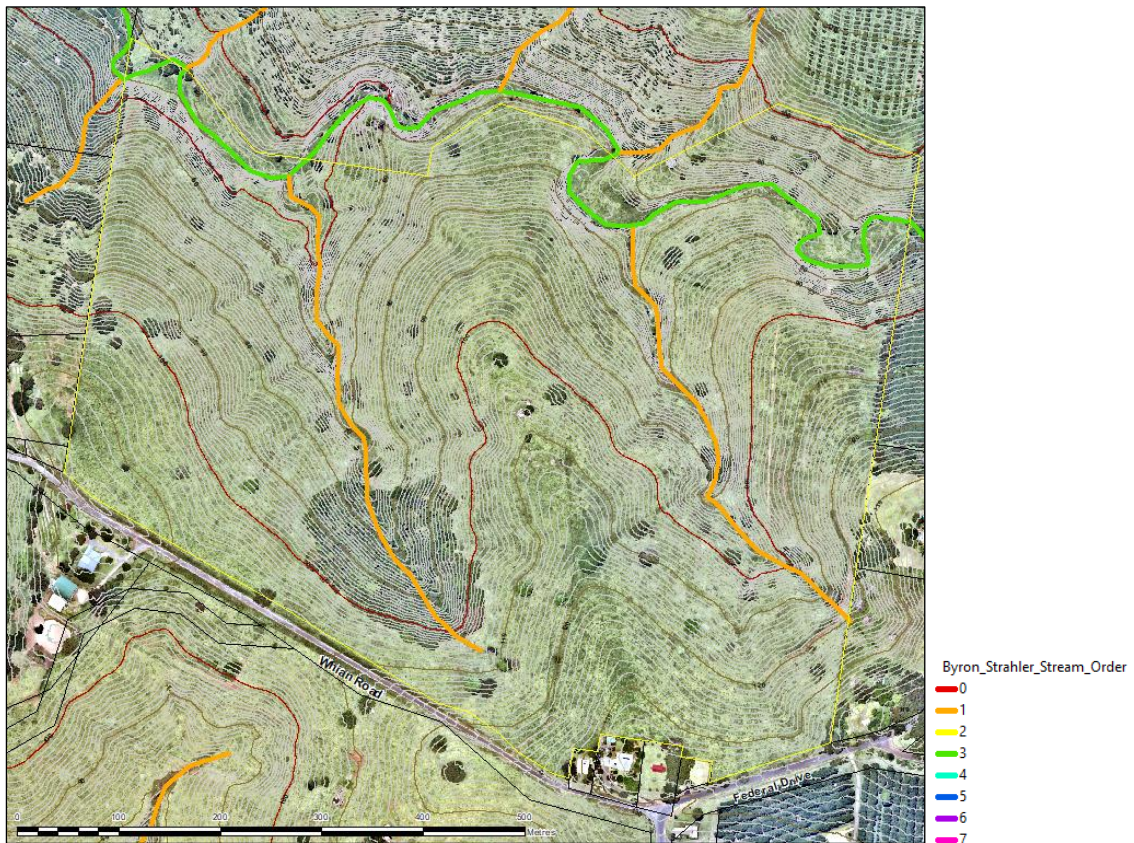
2.3.4 Watercourses and Riparian Corridors

The subject property contains numerous mapped watercourses that were identified and classified using the NSW Strahler System of stream ordering.

Figure 9 below depicts the following mapped watercourses:

- 1 x third order stream (green) in the northern portion of the site
- 2 x first order streams (orange) that adjoin the third order stream

The NSW guidelines for riparian corridors describe the recommended vegetated buffers surrounding watercourses on the site. Vegetated riparian corridors provide important environmental functions in maintaining water catchment health and regulating runoff. The protection of existing riparian vegetation as well as the restoration of native vegetation within riparian corridors is recommended.



Recommended riparian corridor (RC) widths

Watercourse type	VRZ width (each side of watercourse)	Total RC width
1 st order	10 metres	20 m + channel width
2 nd order	20 metres	40 m + channel width
3 rd order	30 metres	60 m + channel width
4 th order and greater (includes estuaries, wetlands and any parts of rivers influenced by tidal waters)	40 metres	80 m + channel width

(NSW Office of Water, 2012a)

Figure 9: NSW Strahler System of ordering watercourses and recommended riparian corridors.

2.4 Ecological Assessment

2.4.1 Vegetation Communities

The property at 16 Whian Road, Eureka has been subject to significant land use modification since European settlement in the later 1800s, firstly from the 'cedar getters' who selectively harvested rainforest timbers, predominately Red Cedar, White Beech and other speciality timbers, followed by broadscale land clearing when most of the endemic subtropical rainforest was cleared to allow for the establishment of dairy farming. Historic aerial photographs within Appendix C depict approximately 50 years of vegetation cover on the site.

The site currently contains a combination of open grazed grasslands with scattered paddock trees, areas of regrowth vegetation and a significant rainforest Big Scrub remnant, referred to as the Midland Remnant or Olive's Scrub.

The property is dominated by exotic grassed grazing lands, and regrowth vegetation is limited to some steeper gullies and riparian areas. The scattered paddock trees are comprised of mostly native rainforest species, including some large Australian Teak trees as well as Camphor Laurel.

Vegetation has been mapped on the site for the purposes of this vegetation management plan in Appendix D. A preliminary flora species list is provided in Appendix E, that includes native and exotic species on the overall site, and a separate list of identified species within the Midland Big Scrub Remnant.

The following vegetation communities have been identified and described on the subject property:

1. Midland Rainforest Remnant / Olive's Scrub

Remnant Big Scrub Rainforest – tall, closed subtropical rainforest remnant surrounded by grazing grassland in a small gully with a mapped drainage line.

Area: 2.1 ha

NSW PCT Classification: Subtropical Rainforest PCT 1302 - White Booyong - Fig subtropical rainforest of the NSW North Coast Bioregion

Keith Vegetation Formation: KF_CH1_Rainforests

Keith Vegetation Class: 1_Subtropical Rainforests

Dominant Species: Mixed native subtropical rainforest species

Canopy: Established canopy dominated by native rainforest 25m - 40m.

Mid Stratum: Highly structured mid-storey with high diversity of rainforest species, including large established vines, shrubs, palms and ferns.

Ground Stratum: Includes range of native rainforest ferns, sedges and herbs.

Other Features:

- Not currently fenced, however cattle do not appear to access the remnant area due to a thick vegetated edge.
- Important genetic diversity of subtropical rainforest species representing The Big Scrub that once covered a large area of the North Coast region.
- Some minor weed infestations including Camphor Laurel, Large-leaf Privet and Lantana mostly on the edges.
- Low connectivity to surrounding habitat areas, essentially a habitat island.

2. Regrowth Camphor Laurel / Subtropical Rainforest

Regrowth forest – open to semi-closed regrowth of varying ages, species diversity with minimal structure and dominance by exotic weed species.

NSW PCT Classification: Not Applicable

Dominant Species: Camphor Laurel, exotic weeds and native rainforest species

Native species dominated by Sweet Pittosporum, Guioa, Sally Wattle, Red Kamala, Cudgerie, Silky Oak.

Canopy: 5-25 metres ranging from very low canopy to higher canopy, mostly very scattered coverage.

Mid Stratum: highly variable density and composition, lacking species diversity and structure of a sub-tropical rainforest, containing numerous weeds.

Ground Stratum: contains high percentage of exotic grasses and weeds.

Other Features:

- Dominant canopy tree is Camphor Laurel.
- Native species mostly comprised of common pioneer species.

3. Paddock Trees

The site contains a high number of scattered paddock trees that include mostly native species such as Australian Teak, Silky Oak, Cudgerie, Red Bean, Foambark, Hoop Pine as well as the exotic Camphor Laurel.

4. Open Grasslands

The site contains mostly open grasslands utilised for grazing that is dominated by exotic grass species including Kikuyu, Seteria, and Broad-leaf Paspalum as well as other species.

2.4.2 Vegetation Mapping

Byron Council mapping shows multiple areas of High Environmental Value (HEV) vegetation (Figure 10) that includes the following locations on the site:

- Midland big scrub rainforest remnant.
- North-east area adjacent to the Allansby rainforest remnant on the neighbouring allotment.
- Scattered paddock tree clumps and regrowth vegetation.

NSW Biodiversity Values Map is depicted below (Figure 11), with the areas shown in purple as:

- Midland big scrub rainforest remnant.

Note. The Biodiversity Values (BV) Map identifies land with high biodiversity value that is particularly sensitive to impacts from development and clearing. The map forms part of the Biodiversity Offsets Scheme threshold, which is one of the factors for determining whether the Biodiversity Offset Scheme (BOS) applies to a clearing or development proposal. The map is prepared by the Department of Planning and Environment under Part 7 of the Biodiversity Conservation Act 2016 (BC Act).



Figure 10: HEV Vegetation (Source: BSC, 2019)

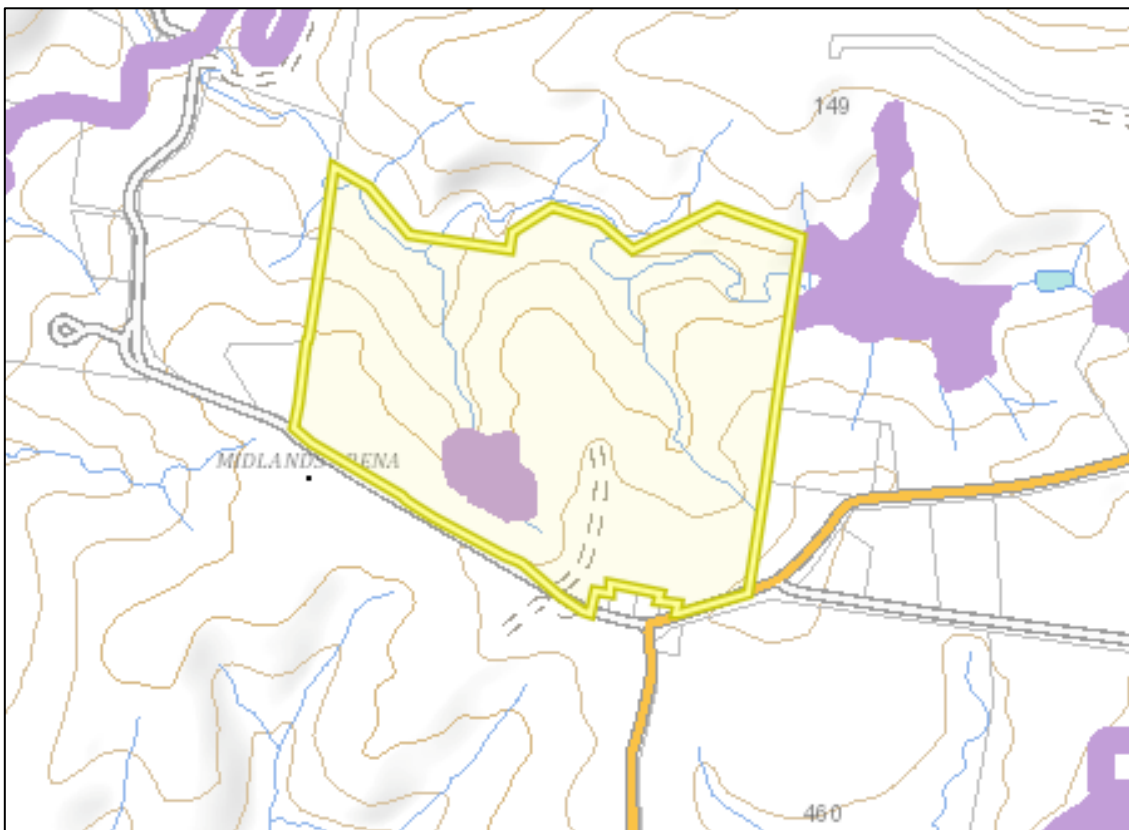


Figure 11: NSW Biodiversity Values Mapping (2020)

2.4.3 Environmental Weeds

The majority of the site contains exotic grazing grass species which have also spread into areas that will be targeted for environmental works. The spread of exotic grasses into regeneration areas prevents the establishment of native rainforest seedlings and will also restrict the growth of any rainforest plantings.

Camphor Laurel is the most dominant tree weed species on the site, and is present in varying size and age classes, with tremendous potential for establishment within areas where grazing is restricted. The current owner has done an exceptional job at restricting the wide scale spread of Camphor Laurel on the site.

Other weeds common to the locality such as Lantana are not as prevalent, however Small-leaf Privet is also present on the site in some areas along creeks, along with Blue Billygoat Weed and other *Solanum* species are spread out around the property.

The North Coast Strategic Weed Management Plan 2017-2022 identifies regional priority weeds that pose a significant risk and outlines responses to achieve weed management outcomes, which also guides the implementation of the NSW Biosecurity Act 2015 (repeals the Noxious Weeds Act 1993). The priority weeds for the region are set out in the plan, with additional information provided on the NSW DPI website and the WeedWise application.

Weeds of National Significance (WONS) currently include a list of 32 individual species or genera based on their level of invasiveness, potential to spread further and ability to generate adverse social or economic impacts. The site contains some small patches of Lantana, a listed WONS within the north-eastern portion of the site, where there has already been some management works.

The most significant environmental weeds on the property are shown in the following Table 3:

Table 3: Key environmental weed descriptions

Species	Classification	Description
Camphor Laurel <i>Cinnamomum camphora</i>	State Level Priority Weed: Asset Protection	evergreen tree which grows up to 20 m in height. It has a large, spreading canopy and a short, stout bole or trunk up to 1.5 m in diameter. Flowers are minute, white, fruit is a round berry 8 mm in diameter green when immature and ripen to black. Camphor laurel grows in areas of high rainfall, averaging 1000 mm or higher. Camphor laurel can grow on a wide range of soil types but especially prefers fertile flood plains and soils derived from basalt.
South African pigeon grass <i>Setaria sphacelata</i>	State Level Priority Weed: Not-listed	A densely-tufted and long-lived grass often growing up to 2 m tall. Its green or somewhat bluish-green leaves are elongated in shape (10-50 cm long 3-17 mm wide) and mostly hairless. Its spike-like seed-heads (7-50 cm long) have densely clustered flower spikelets borne in small groups.
Small-leaf Privet <i>Ligustrum sinense</i>	State Level Priority Weed: Asset Protection	evergreen shrub or small tree to a height of 2–5 m with cream or white tubular flowers and berries green turning to purplish black as ripen. Creeks, gullies and drainage lines are favoured while seedlings can tolerate very low light levels.
Giant devil's fig <i>Solanum chrysotrichum</i>	State Level Priority Weed: Asset Protection	An upright and spreading shrub or small tree with prickly stems and leaves. Its younger stems and leaves are densely covered in star-shaped hairs. Its very large leaves (9-35 cm long and 5.5-30 cm wide) are usually deeply lobed. Its white star-shaped flowers (3-4.5 cm across) are borne in large branched clusters. Its globular fruit (10-15 mm across) turn yellow as they mature.
Blue billy goat weed <i>Ageratum houstonianum</i>	State Level Priority Weed: Not-listed	A short-lived herbaceous plant with softly hairy stems and leaves. Its toothed leaves are oppositely arranged at the base of the stems, but are often alternately arranged at the top of the stems. Its flower-heads are usually blue (occasionally pink or whitish) and lack any obvious 'petals'these flower-heads have very hairy bracts and numerous long narrow projections.
Lantana <i>Lantana camara</i>	State Level Priority Weed: Asset Protection Weed of National Significance.	heavily-branched, scrambling, thicket-forming shrub, usually ranging from 2–4 m in height that can also grow up trees. Lantana thrives under warm, high rainfall climates but can survive prolonged dry periods. Small white to pink to orange flowers.

2.4.4 Fauna Species and Habitat

The attached NSW Bionet Atlas search (Appendix F) contains a search of recorded fauna species in the surrounding locality (10km x 10km).

There were no specific fauna surveys undertaken on the subject property, however the site inspections did note any fauna species identified on the site (Table 4) while an analysis was undertaken of suitable habitat for each fauna group (Table 5).

Table 4: Identified Native Fauna Species

Common Name	Scientific Name
Australian Raven	<i>Corvus coronoides</i>
Cattle Egret	<i>Bubulcus ibis</i>
White-headed Pigeon	<i>Columba leucomela</i>
Crested Pigeon	<i>Ocyphaps lophotes</i>
Australian Magpie	<i>Cracticus tibicen</i>
Australian water dragon	<i>Intellagama lesueurii</i>
Grey Butcher Bird	<i>Cracticus torquatus</i>
Noisy Minor	<i>Manorina melanocephala</i>
Red-necked wallaby	<i>Macropus rufogriseus</i>
Eastern Yellow Robin	<i>Eopsaltria australis</i>
White Cockatoo	<i>Cacatua alba</i>
Grey Fantail	<i>Rhipidura albiscapa</i>
Red-browed Finch	<i>Neochmia temporalis</i>
Eastern Whipbird	<i>Psophodes olivaceus</i>
Brown Cuckoo-Dove	<i>Macropygia amboinensis</i>
Kookaburra	<i>Dacelo novaeguineae</i>

Table 5: Fauna Habitat Analysis

Fauna Group	Description
Birds	The property contains the Midland Remnant that provides the best native habitat for native birds; however, it is highly isolated from other habitat areas, therefore reducing the suitability for a high diversity of species. Common species on the site include those that are found on farms or disturbed habitat areas.
Mammals	The property contains minimal habitat for a high diversity of native mammal species, while there is zero Koala habitat on the site currently, the property would have originally contained sub-tropical rainforest and no Koala habitat. It's likely that bandicoots, wallabies, echidnas and other small rodents and marsupials can be found on the site in small numbers.
Reptiles	The site contains many rocky outcrops and sheltered gullies that provide excellent habitat for snakes and lizards.
Amphibians	The site contains excellent habitat for native frogs and amphibians, as well as the invasive cane toad.
Fish / Crustaceans	The permanent creek along the northern boundary may contain some habitat for small native fish, eels and freshwater yabbies and invertebrates. The creek is not likely to contain habitat for the Eastern Freshwater Cod due to its smaller size.

2.4.5 Threatened Species and Endangered Ecological Communities

A search of the NSW BioNet Database shows there are a total of 1,178 records of 47 native species, which are listed as either threatened flora or fauna in NSW, within a 10km x 10km grid area with the property at the centroid (Appendix F). Figure 12 shows the NSW SEED Portal search for recorded native species.

The Midland Big Scrub Remnant area contains two listed threatened flora species, shown in the below image as the red dot, being the following:

- *Tinospora tinosporoides* - Arrow-head Vine
- *Rhodamnia rubescens* - Scrub Turpentine

There are no other recorded threatened species located in other areas of the property. NSW BioNet Species Sightings Data did not show any Koala sightings on the subject property or any other threatened fauna species.

The Midlands Remnant is also recognised as an Endangered Ecological Community (EEC) 'Lowland Rainforest in the NSW North Coast and Sydney Basin' under the Biodiversity Conservation Act 2016. This vegetation community is also listed as a Threatened Ecological Community (TEC) under the Environmental Protection and Biodiversity Conservation Act 2000.

The fauna assessment table within Appendix G contains an analysis of all potential threatened species on the site and their likelihood of occupying the site.

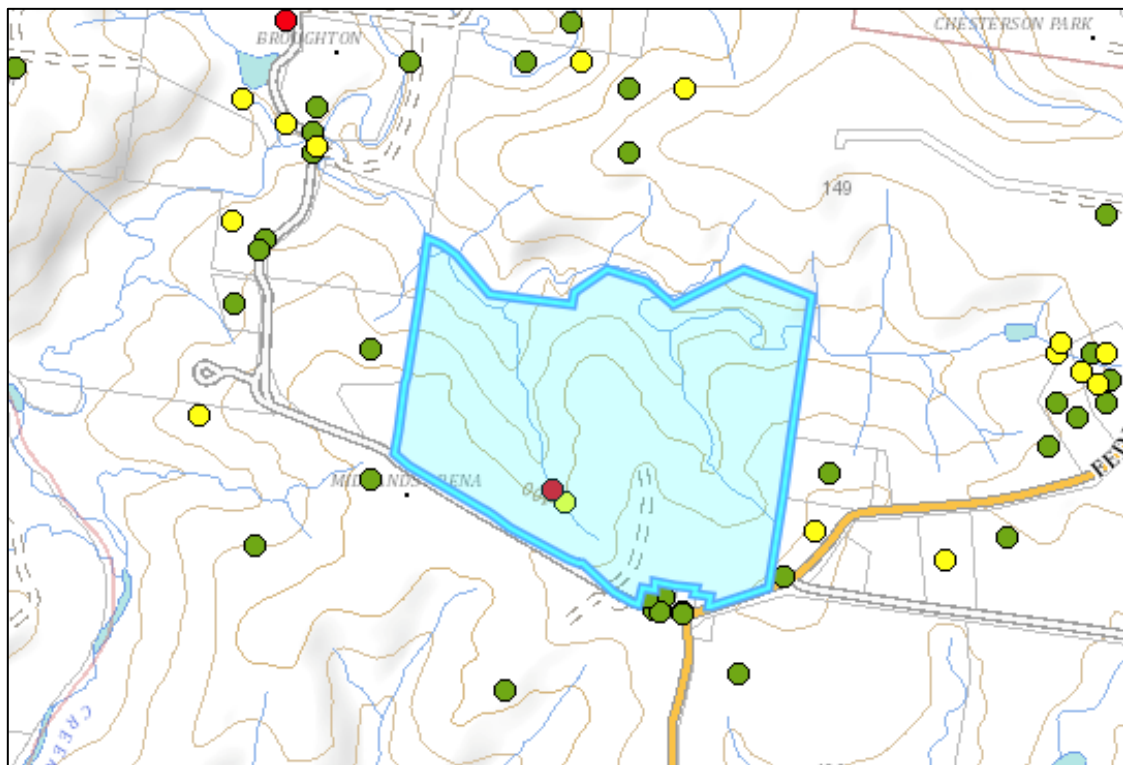


Figure 12: NSW BioNet Species Sightings Data (NSW SEED Portal)

2.4.6 Biodiversity Test of Significance

The following Biodiversity Test of Significance (BC Act 2016) applies the standardised framework for assessing the potential impacts of the proposed development of threatened species or ecological communities.

Test of Significance – Lowland Rainforest in NSW North Coast and Sydney Basin Bioregion (EEC)

The following 5-part-test (Section 7.3 BC Act 2016) has been applied to the Endangered Ecological Community - Lowland Rainforest in NSW North Coast and Sydney Basin Bioregion, listed under Part 3 of Schedule 1.

Key threatening processes are listed under the listing, that includes land clearing for residential development or agriculture, habitat fragmentation, invasion of exotic weeds, and high frequency fire regimes.

The primary issue with the existing Midlands Remnant is that it is currently isolated from other areas of habitat, including regrowth vegetation, being surrounded by grazing grasslands, however it does still show good health and minimal disturbances.

7.3 Test for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats:

(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Not Applicable

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

The proposed Multiple Occupancy has located dwelling sites well away from the Midlands Remnant EEC, and the overall concept includes significant ecological repair and enhancement works on the site. It is highly unlikely that the proposal will generate adverse environmental impacts on the remnant, while the overall site's habitat connectivity will be improved with implementing the vegetation management plan.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

The proposed Multiple Occupancy does not propose to remove or modify any endangered ecological community on the site, nor will it result in fragmentation of habitat areas and dedicates areas on the site to be managed for habitat purposes only.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

Not applicable.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

There are no direct or indirect key threatening processes on the areas of EEC as a result of the proposal, while the VMP will attempt to reduce existing key threatening processes.

Test of Significance – Scrub Turpentine and Arrow-head Vine

The following two species of native plants that were recorded on the site which are listed as threatened species under the NSW Biodiversity Conservation Act 2016:

- Scrub Turpentine - *Rhodamnia rubescens*

Description: Shrub or small tree to 25 m high with reddish/brown, fissured bark. Typically found in coastal areas within littoral, warm temperate and subtropical rainforests and sometimes wet sclerophyll. Currently subject to severe Myrtle Rust impacts.

Conservation status in NSW: Critically Endangered
Commonwealth status: Not listed

- Arrowhead Vine - *Tinospora tinosporoides*

Description: Usually a small tree, although it can grow to 25 m tall while the stem is often crooked, and has dark, scaly bark. Understorey tree in lowland subtropical rainforest, often close to rivers.

Conservation status in NSW: Endangered
Commonwealth status: Endangered

Overall, key threatening processes include land clearing for development or agriculture, disturbance by farm animal stock, habitat fragmentation, invasion of exotic vines and scramblers, invasion of aggressive exotic species, and high frequency fire regimes.

7.3 Test for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats:

(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The proposal is highly unlikely to have any adverse impacts on the life cycle of the listed plant species on the site. The attached VMP incorporates protection of vegetation areas on the site that contain the identified species.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

Not applicable.

(c) in relation to the habitat of a threatened species or ecological community:

- (i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and**
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**

The proposed development does not seek the removal of any native vegetation. The proposal also does not propose to impact on habitat areas of the site. The habitat of the threatened species will be improved with a significant investment into environmental protection and enhancement works. The site will not become fragmented with proposed dwelling sites and infrastructure suitably clustered in existing open areas of the site.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

Not applicable.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

Not a key threatening process, however it is recommended that no dogs or cats be allowed on the property, except for certain purposes such as farm work or personal assistance.

2.4.7 Habitat Connectivity

The subject property is surrounded by a highly modified landscape, with large areas of macadamia orchards and grassed grazing lands with some areas of regrowth forest comprising mostly Camphor Laurel. There are a number of significant 'Big Scrub' rainforest remnants in the surrounding area, that includes the Allansby Remnant on neighbouring properties to the east, Nobles Scrub located on a private property adjacent to Eureka Primary School to the south, Johnstons Scrub a 21-hectare formal Nature Reserve and Lune de Sung rainforest remnant with large-scale regeneration project on a private property to the north.

Key connectivity considerations include the following:

- The Allansby remnant on the neighbouring properties to the east, has had the eastern section regenerated in the 1990s while the western portion on 149 Federal Drive is subject to VMP works as part of a community title subdivision, including revegetation works along unnamed tributaries of Whian Creek.
- Property at 150 Whian Road is a community title subdivision that contains regeneration works along Whian Creek.
- Property at 101 Whian Road is a community title subdivision that contains regeneration works along Whian Creek.
- Whian Creek and Coopers Creek are located to the west of the subject site, with the main creek in the north of the property providing means for a riparian rainforest corridor.

The following map depicted the subject site and the surrounding identified Big Scrub Remnants as well as other nearby vegetation management plans for ecological works on existing MO/CT properties (Figure 13).

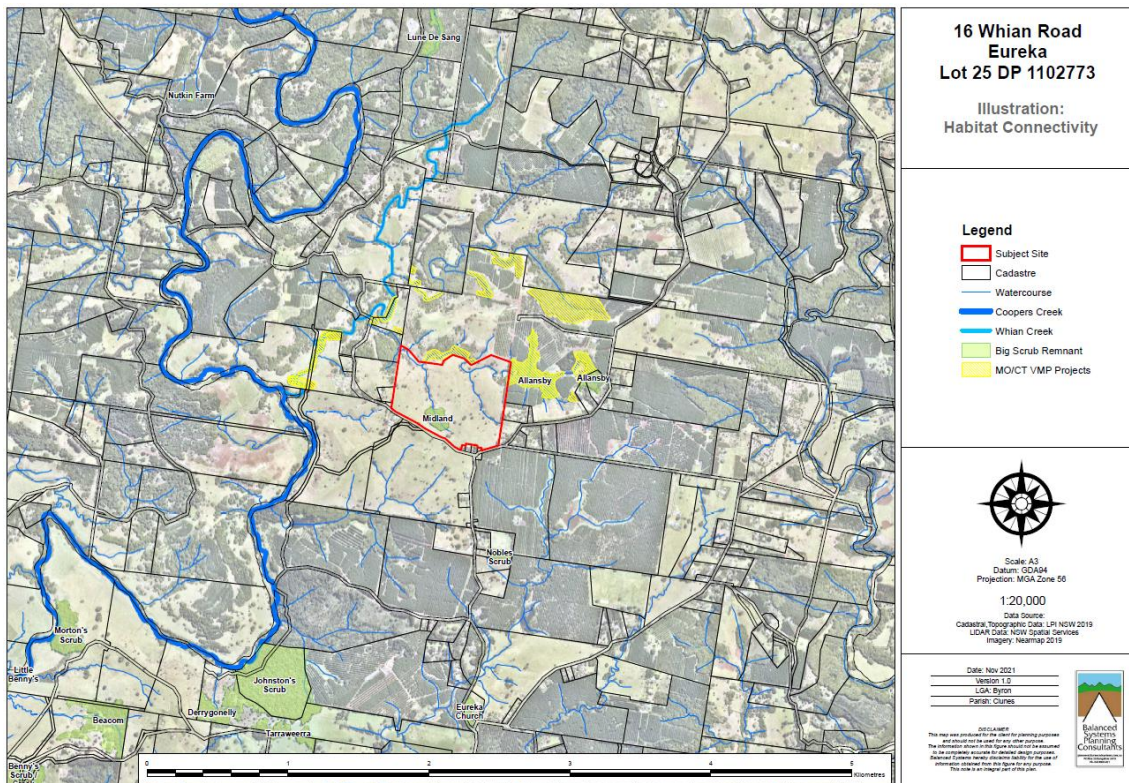


Figure 13: Surrounding habitat connectivity locality analysis

2.5 Summary

This Ecological Assessment has conducted a comprehensive review of existing environmental conditions on the site, analysed the existing ecological values contained within the property and surrounding area, and provides an evaluation of the proposed Multiple Occupancy at 16 Whian Road, Eureka, in terms of environmental impacts.

The proposed layout plan has been implemented to avoid and reduce any environmental impacts. The Multiple Occupancy proposal is accompanied by a Vegetation Management Plan that conforms to the requirements of the Byron DCP 2014. The proposal is consistent with the aim and objectives of Chapter B1 Biodiversity, and is highly consistent with the Biodiversity Planning Principles set out in Section B1.1.5 and other sections of the chapter.

Table 3: Byron DCP 2014 – Chapter B2

Biodiversity Red Flag	Setback Guideline	Compliance Statement
Threatened Ecological Communities	30m	All dwellings and infrastructure are well setback from Lowland Subtropical Rainforest areas.
Old growth	30m	All dwellings and infrastructure are well setback from areas of remnant or old growth vegetation.
Important wetlands	50m	There are no wetlands on the site.
Other wetlands	20m	There are no wetlands on the site.
Other bushland on a slope >18 degrees	20m	All dwellings and infrastructure contain adequate setbacks from steep sloped vegetation.
Pre-existing protected habitat	20m	All dwellings and infrastructure are well setback.
Land within a defined wildlife corridor	20m	All dwellings and infrastructure are well setback.
Areas with a species polygon for threatened fauna or other significant fauna that are known or predicted to occur at the site.	20m	All dwellings and infrastructure are well setback.
Areas with a species polygon for threatened flora or other significant flora that are known or predicted to occur at the site.	20m	All dwellings and infrastructure are well setback.
Koala habitat outside of areas defined within a Comprehensive Koala Plan of Management.	20m	Not Applicable.
Isolated or scattered koala use trees with evidence of koala activity	20m	Not Applicable.
Stream order	Various	All dwellings and infrastructure are well setback from the various classed watercourses.
Flying fox camps	100m	There are no flying fox camps onsite.
Very large native trees	10m	All dwellings and infrastructure are well setback.
Raptor nests	50m	All dwellings and infrastructure are well setback.

In conclusion, the proposed Multiple Occupancy containing 14 vacant dwelling sites, will not result in any significant adverse ecological impacts, and with the following section of this report containing the Vegetation Management Plan, will include substantial ecological works on the site that will result in positive long-term environmental outcomes.

3. VEGETATION MANAGEMENT PLAN

The Vegetation Management Plan (VMP) section of the report contains the following sub-sections:

- 3.1 Overview and Justification** – describes reasons for the creation of the VMP.
- 3.2 Vegetation Management Zones** – outlines the proposed VMZs tool.
- 3.3 Description of Works** – comprises a set of broad actions for environmental works.
- 3.4 Timeline** – provides the time required to implement the action plan.
- 3.5 Key Performance Indicators** – KPIs provide a set of measurable indicators of success.
- 3.6 Ecological Works Schedule** – contains scheduled actions to be carried out for each VMZ.
- 3.7 Environmental Weed Management** – outlines proven methods for management of environmental weeds.
- 3.8 Assisted Natural Regeneration** – outlines description of A.N.R. actions.
- 3.9 Revegetation Strategy** – outlines proven methods for environmental plantings.
- 3.10 Adaptive Management** – provision for adaptive management throughout implementation.
- 3.11 Bushfire Management** – planning for bushfire protection through vegetation management.
- 3.12 Outcomes** – lists intended outcomes for the action plan.
- 3.13 Monitoring and Reporting** - monitoring and reporting requirements.

3.1 Overview and Justification

The proposed Multiple Occupancy includes large-scale ecological repair and enhancement works on the subject site, as outlined within this Vegetation Management Plan document. The Byron Council DCP 2014 requires 900 tree plantings or equivalent works as bush regeneration works per M.O. dwelling site, as summarised within Appendix A.

The proposed Multiple Occupancy at 16 Whian Road, Eureka includes 14 dwellings sites, that requires 12,600 native tree plantings or equivalent works as bush regeneration where suitable.

The property contains a centrally located Big Scrub rainforest remnant, being the Midland Remnant, also known as Olive's Scrub. The overall property is a key location in the surrounding locality in terms of being able to provide linkages to other areas of habitat, as outlined within the above sections.

The following table depicts the ecological works calculations in accordance with the Byron DCP 2014, used achieve the required 12,600 tree plantings or equivalent bush regenerations works on the site, this also includes protective fencing construction as one of the works categories.

Table 2: Ecological Works Conversion

Ecological Works Type	Description	Area Calculation
Rainforest Plantings	Rainforest species plantings and maintenance	900 plantings spaced at 2.5-3 metres per 0.5 hectares
Assisted Natural Regeneration for >50% weed cover (x 2)	Bush regeneration works including primary and secondary weed control to encourage natural regeneration	Bush regeneration (x2) results in 900 trees worth of work per 1 hectare
Weed Management for <50% weed cover (x 4)	Weed management within well-established native ecosystems	Weed management (x4) results in 900 trees worth of work per 2 hectares
Vegetation Protection Fencing	Fencing to protect vegetation management zones	1 metre = 1 tree planting

3.2 Vegetation Management Zones

Vegetation Management Zones (VMZs) have been mapped on the subject property for the purposes of designating environmental works as part of the proposed Multiple Occupancy.

The ecological enhancement works will be conducted within the following Vegetation management zone as a part of this Vegetation Management Plan:

- Midlands Big Scrub Remnant
- Allansby Remnant Extension
- Eastern Valley

Table 5 shows the proposed ecological works on the site within each Vegetation Management Zone and shows the calculated equivalent works where not undertaken as tree plantings.

Table 3: Ecological Works Table

VMZ	Area (ha)	Stage	Works Description	Trees planted / Equivalent trees planted
Midlands Big Scrub Remnant	2.1	1	- Weed Management for <50% weed cover (x 4) in 2.1 ha - Vegetation protection fencing 600 metres around entire remnant	600 600 sub-total: 1,200
Allansby Remnant Extension (Stage 1)	1.9	1	- Assisted Natural Regeneration for >50% weed cover (x 2) in 0.4 ha - Rainforest plantings in 1.5 ha	400 2,900 sub-total: 3,300
Allansby Remnant Extension (Stage 2)	2.2	2	- Weed Management for <50% weed cover (x 4) in 1 ha - Rainforest plantings in 2.2 ha - Vegetation protection fencing along western edge of the VMZ for 200 metres	500 3,800 200 sub-total: 4,500
Eastern Valley	1.8	3	- Weed Management for <50% weed cover (x 4) in 0.6 ha - Rainforest plantings in 1.8 ha - Vegetation protection fencing along western edge of the VMZ for 600 metres	300 2,700 600 sub-total: 3,600
TOTAL				12,600

The VMZs are mapped within Appendix I – Illustration: Vegetation Management Plan, including Stage 1, Stage 2 and Stage 3 works to correspond with the project staging.

Management Zone Selection

Each of the designated VMZs have been selected for the following reasons:

- Midlands Big Scrub Remnant

The Midlands Remnant is a regionally important ecosystem EEC remnant which contains highly valued subtropical rainforest species representative of The Big Scrub.

- Allansby Remnant Extension

Located in the north-east portion of the site, and extending down a prominent gully with a small watercourse, the Allansby Remnant Extension area is located adjacent to a recognised Big Scrub Remnant on the neighbouring property to the east, of which contains an approved Multiple Occupancy / Community Title Subdivision that is undertaking large-scale regeneration works of the Allansby Remnant section.

- Eastern Valley

Located in the eastern portion of the site, this area extends up the gully from the Allansby Remnant Extension, that is easily accessible and provides improved amenity for the MO dwelling sites.

Staging of Works

- Stage 1 comprises a total of 5 MO dwelling sites requiring 4,500 tree plantings or equivalent.
- Stage 2 comprises a total of 5 MO dwelling sites requiring 4,500 tree plantings or equivalent.
- Stage 3 comprises a total of 4 MO dwelling sites requiring 3,600 tree plantings or equivalent.

3.3 Description of Works

The following broad actions describe ecological works that are detailed in the works schedule:

Action 1. Protect existing native vegetation

Native vegetation to be protected during construction works and environmental works. Any identified threatened species require additional protection and subsequent permits for works in their vicinity. Where native vegetation is located nearby to proposed infrastructure, all works must comply with AS 4970-2009 for protection of native trees on development sites. This particularly applies to the mature native paddock trees. Any tree removal will be offset with additional native plantings on the subject site at a rate of 10 to 1.

Action 2. Environmental Weed Management / Assisted Natural Regeneration (ANR)

Environmental weeds are a significant threat to the existing rainforest remnant and proposed enhanced habitat areas on the property. Management and control of environmental weeds is most successful at early stages of growth to prevent their successful establishment and potential spread around the property and from re-emerging at a later date. The implementation of a large-scale weed management program across the site will significantly increase biodiversity on the property and ensure existing native species are protected. Habitat creation for both native flora and fauna species will allow for fully functioning ecosystems to develop.

The Assisted Natural Regeneration (ANR) or bush regeneration method for enhancing the establishment of native forest from a degraded condition, by protecting and nurturing larger trees and encouraging natural seedling establishment. ANR aims to accelerate, rather than replace, natural successional processes by removing or reducing barriers to natural forest regeneration. The site is mostly open grassland the only area of ANR is located within the Allansby Remnant Extension VMZ.

Action 3. Rainforest plantings

Native rainforest plantings will provide significant improvements to the site, in terms of creating new habitat areas and connections to other adjacent habitat areas. All plants should be sourced from

local nurseries and contain a suitable mix of species. The survival and successful establishment of native plantings is a long-term priority by reducing cattle access and implementing a maintenance schedule.

Environmental weeds pose the most significant challenge to the long-term success of tree plantings on the site. Climatic factors including rainfall, temperature, flooding and frost may have an impact on the success of environmental plantings in certain locations. Erosion and sediment transport within gullies and drainage lines requires additional measures to protect tree plantings. It is essential that correct procedures considering these constraints be adopted for native tree plantings.

Action 4. Monitor environmental works

Environmental works conducted on the site required ongoing monitoring and reporting, that includes establishing a baseline condition, allocating monitoring locations and completing annual reporting requirements.

3.4 Timeline

This VMP will be implemented over a management period of **5 years for each stage** with primary works conducted within the first 1 or 2 years. The proposed ecological works will be conducted in accordance with an adaptable environmental works schedule, that includes a yearly works plan for the vegetation management zone. The timeline will allow for suitable on-site management to maximise resources, improve efficiency of works and lead to a cyclic system of management.

3.5 Key Performance Indicators (KPIs)

The following KPIs are to be used as criteria for progress, monitoring and reporting.

1. Native vegetation is protected from key threatening processes, including existing paddock trees on the site and areas of regrowth vegetation.
2. Environmental weeds are eradicated, controlled and prevented from re-emerging within the VMZs:
 - Primary 1st year works result in ground & mid stratum reduced to 75% cover of baseline (at end of year 1).
 - Secondary 2nd year works results in ground & mid stratum reduced to 90% cover of baseline (at end of year 2).
 - Annual weeds and exotic grasses no greater than 20% of total cover at the end of year 5.
3. Rainforest plantings within the VMZs:
 - Grassed areas to be slashed / brush-cut prior to plantings with plant circles established.
 - Plantings to include water crystals, mulch, fertiliser and watering.
 - Plantings to include plant protector where required.
 - 90% survival rate of plantings (after 24 months following the completion of planting activities) with replacement plantings where required.
4. Rainforest plantings must achieve a minimum height of 50cm and have visual evidence of healthy growth after 24 months following the completion of planting activities.
5. VMZ contains minimum 75% native canopy cover at 5th year to suppress weed growth and create minor
6. The VMP does not generate adverse conditions for bushfire management for the proposed Multiple Occupancy.
7. On-going monitoring data is collected and evaluation reports submitted to Council.

3.6 Ecological Works Schedule

Tables: Ecological Works Schedule

(Dark colour = higher intensity works, Light colour = lower intensity & passive works)

Vegetation management zone (VMZ)	Detailed Works	Year					KPI
		1	2	3	4	5	
Midland 'Big Scrub' Rainforest Remnant	1. Protect existing native vegetation						
	<ul style="list-style-type: none"> Identify, mark and GPS threatened flora or fauna species found on-site by utilising fluoro flagging tape as well as indicating on the VMP map. 						1
	<ul style="list-style-type: none"> Protect native flora, including native seedlings, whilst undertaking control of environmental weeds. 						1
	<ul style="list-style-type: none"> Fence entire area with suitable permanent cattle proof fencing – 600 metres 						1
	2. Manage environmental weeds						
	Undertake weed management and assisted natural regeneration works within the management zone: Year 1 – Primary Works <ul style="list-style-type: none"> Small-leaf Privet cut & paint or drill & inject with herbicide. Large-leaf Privet cut & paint or drill & inject with herbicide. Camphor Laurel small trees cut & paint or drill & inject with herbicide. Lantana cut & paint with herbicide. Manual removal / cut & paint exotic vines Spot spray other ground weeds. Year 2 to 5 – Maintenance <ul style="list-style-type: none"> Weed seedlings to be manually removed and/or spot sprayed with herbicide. 	Primary	Maintenance	Maintenance	Maintenance	Maintenance	2
	4. Monitor environmental works						
Undertake monitoring and reporting. <ul style="list-style-type: none"> Establish baseline conditions Implement GPS Photopoints for monitoring Annual monitoring report Final 5-year report 	1	2	3	4	Final	7	

Vegetation management zone (VMZ)	Detailed Works	Year					KPI
		1	2	3	4	5	
Allansby Remnant Extension (Stage 1)	1. Protect existing native vegetation						
	<ul style="list-style-type: none"> Identify, mark and GPS any significant native trees or threatened flora or fauna species found on-site by utilising fluoro flagging tape as well as indicating on the VMP map. 						1
	<ul style="list-style-type: none"> Protect native flora, including native seedlings, whilst undertaking control of environmental weeds. 						1
	2. Assisted natural regeneration						
	Year 1 – Primary Works <ul style="list-style-type: none"> Camphor Laurel small trees cut & paint with herbicide. Small-leaf Privet cut & paint or drill & inject with herbicide. Lantana cut & paint with herbicide. Solanum sp. cut and paint with herbicide. Manual removal / cut & paint native vines where required, including Water Vine, Cockspur Spot spray or manual removal of other ground weeds. Year 2 – Secondary Works <ul style="list-style-type: none"> Follow-up and repeat year 1 works where required. Year 3 to 5 – Maintenance <ul style="list-style-type: none"> Weed seedlings to be manually removed and/or spot sprayed with herbicide. Lantana sprayed or large stems cut & paint. Follow-up on lantana regrowth shoots. 	Primary	Secondary	Maintenance	Maintenance	Maintenance	2
	Eradication of large Camphor Laurel trees using herbicide treatments by selectively drill and inject method. <ul style="list-style-type: none"> Year 1 - reduce Camphor Laurel canopy cover to <100% or the original cover within the VMZ. Stem inject Camphor Laurel with herbicide. Year 2 – any Camphor Laurel not yet dead, follow up herbicide treatments. 	Primary	Maintenance				2
	Assisted natural regeneration of native rainforest within the proposed management zone: <ul style="list-style-type: none"> Disturbance by means of large-scale weed control to promote native seedling growth. Established and emerging weeds to controlled following primary treatment. Maintain bush regeneration works until native regrowth is established with adequate canopy. 						5
	3. Rainforest Plantings						
	<ul style="list-style-type: none"> Undertake 2,900 rainforest plantings within the VMZ. Year 1 primary rainforest plantings. Year 2 secondary rainforest plantings. Year 3, 4 and 5 maintenance and infill plantings where required. Maintain, water and fertilise rainforest plantings 	Primary	Secondary	Maintenance	Maintenance	Maintenance	3, 4, 5, 6
	4. Monitor environmental works						
	Undertake monitoring and reporting. <ul style="list-style-type: none"> Establish baseline conditions Implement GPS Photopoints for monitoring Annual monitoring report Final 5-year report 	1	2	3	4	Final	7

Vegetation management zone (VMZ)	Detailed Works	Year					KPI
		1	2	3	4	5	
Allansby Remnant Extension (Stage 2)	1. Protect existing native vegetation						
	<ul style="list-style-type: none"> Identify, mark and GPS any significant native trees or threatened flora or fauna species found on-site by utilising fluoro flagging tape as well as indicating on the VMP map. 						1
	<ul style="list-style-type: none"> Protect native flora, including native seedlings, whilst undertaking control of environmental weeds. 						1
	<ul style="list-style-type: none"> Fence western boundary with suitable permanent cattle proof fencing – 200 metres 						
	2. Manage environmental weeds						
	Year 1 – Primary Works <ul style="list-style-type: none"> Camphor Laurel large trees drill & inject with herbicide. Camphor Laurel small trees cut & paint with herbicide. Small-leaf Privet cut & paint or drill & inject with herbicide. Lantana cut & paint with herbicide. Solanum sp. cut and paint with herbicide. Manual removal / cut & paint native vines where required, including Water Vine, Cockspur Spot spray or manual removal of other ground weeds. 	Primary	Secondary	Maintenance	Maintenance	Maintenance	2
	Year 2 – Secondary Works <ul style="list-style-type: none"> Follow-up and repeat year 1 works where required. 						
	Year 3 to 5 – Maintenance <ul style="list-style-type: none"> Weed seedlings to be manually removed and/or spot sprayed with herbicide. Lantana sprayed or large stems cut & paint. Follow-up on lantana regrowth shoots. 						
	3. Rainforest Plantings						
	<ul style="list-style-type: none"> Undertake 3,800 rainforest plantings within the VMZ. Year 1 primary rainforest plantings. Year 2 secondary rainforest plantings. Year 3, 4 and 5 maintenance and infill plantings where required. Maintain, water and fertilise rainforest plantings 	Primary	Secondary	Maintenance	Maintenance	Maintenance	3, 4, 5, 6
4. Monitor environmental works							
Undertake monitoring and reporting. <ul style="list-style-type: none"> Establish baseline conditions Implement GPS Photopoints for monitoring Annual monitoring report Final 5-year report 	1	2	3	4	Final	7	

Vegetation management zone (VMZ)	Detailed Works	Year					KPI
		1	2	3	4	5	
Eastern Valley	1. Protect existing native vegetation						
	<ul style="list-style-type: none"> Identify, mark and GPS any significant native trees or threatened flora or fauna species found on-site by utilising fluoro flagging tape as well as indicating on the VMP map. 						1
	<ul style="list-style-type: none"> Protect native flora, including native seedlings, whilst undertaking control of environmental weeds. 						1
	<ul style="list-style-type: none"> Fence western boundary with suitable permanent cattle proof fencing – 600 metres 						
	2. Manage environmental weeds						
	Year 1 – Primary Works <ul style="list-style-type: none"> Camphor Laurel small trees cut & paint or drill & inject with herbicide. Manual removal / cut & paint native vines where required, including Water Vine, Cockspur and Supplejack Spot spray other ground weeds. Year 2 – Secondary Works <ul style="list-style-type: none"> Follow-up and repeat year 1 works where required. Year 3 to 5 – Maintenance <ul style="list-style-type: none"> Weed seedlings to be manually removed and/or spot sprayed with herbicide. Lantana sprayed or large stems cut & paint. Follow-up on lantana regrowth shoots. 	Primary	Secondary	Maintenance	Maintenance	Maintenance	2
	3. Rainforest Plantings						
	<ul style="list-style-type: none"> Undertake 2,700 rainforest plantings within the VMZ where natural regeneration is not successful. Year 2 primary rainforest plantings. Year 3 secondary rainforest plantings. Maintain, water and fertilise rainforest plantings 	Primary	Secondary	Maintenance	Maintenance	Maintenance	3, 4, 5, 6
	4. Monitor environmental works						
	Undertake monitoring and reporting. <ul style="list-style-type: none"> Establish baseline conditions Implement GPS Photopoints for monitoring Annual monitoring report Final 5-year report 					Final	7

3.7 Environmental Weed Management

The table below contains an overview of the recommended management of most common environmental weeds within the VMZs:

Species	Approach	Removal and Control	Revegetation	Other Resources
Camphor Laurel <i>Cinnamomum camphora</i>	<p>A number of techniques are available to control camphor laurel. The technique used will depend on the situation, landscape, number of trees to control and resources available. It is important to plan your control program and take a long-term approach including follow-up treatments, control of other weed species, and planting of replacement species. Management should aim to increase competition, which will prevent invasion by camphor laurel.</p>	<p>Manual removal: seedlings can be hand-pulled, making sure the entire root system is removed. Felling larger trees without herbicide results in re-shooting and suckering. Mechanical removal is not recommended on steep slopes or nearby creeks and drainage lines.</p> <p>Chemical control: an effective way of controlling existing infestations. Herbicides can control trees without the need to disturb soil or other vegetation. The method used depends on the site situation, tree size, access, and vegetation:</p> <ul style="list-style-type: none"> - cut stump; - stem injection; - basal bark; or - foliar spray application. 	<p>Replacement with native species is vital for long-term weed control. Native rainforest and other species will often germinate underneath camphor laurels but the intense competition by mature camphor laurels dramatically reduces the ability of those seedlings to grow to maturity. When camphor laurels are controlled in stages these native species are able to grow and replace the camphor laurels.</p>	<p>Camphor Laurel Kit - North Coast Weeds Advisory Committee</p> <p>The Big Scrub Rainforest Landcare Group. 2019. Subtropical Rainforest Restoration</p>
Small-leaf Privet <i>Ligustrum sinense</i>	<p>Wide dispersal of seed by birds cannot be controlled; therefore, controlling the spread of privet requires the removal of seed trees and young seedlings before they produce seed.</p>	<p>Manual removal: Manual removal techniques such as the original 'Bradley method' allow for good control of privet with minimal disturbance to the surrounding vegetation. Narrow-leaf privet can be pulled up but the stems are more likely to break from the root system, leaving viable root segments capable of regeneration. They should be dug out and the plants placed upside-down to dry out the roots.</p> <p>Chemical removal: Foliar treatments can be made to flushes of seedlings and groups of plants up to 3 m high. Cut-stump application of herbicides is very effective for controlling young plants, suckers or regrowth. Stem injection is also appropriate for treating larger individual plants in amongst other vegetation.</p>	<p>Many attempts to control or remove privet have failed because of its ability to regenerate vigorously from root and stem suckers. Follow-up control measures are critical for successful removal. The removal of large numbers of privet bushes from other vegetation can cause enough disturbance that reinfestation occurs. Revegetation along with ongoing weed control, can assist with preventing reinfestation.</p>	<p>The Big Scrub Rainforest Landcare Group. 2019. Subtropical Rainforest Restoration</p>

<p>Giant devil's fig <i>Solanum chrysotrichum</i></p>	<p>Established plants are easy to treat, but the legacy they leave with the seed is a major problem. If you can see any on the property, act immediately to remove them before they mature and set seed. Has become established in most valleys on the NSW North Coast.</p>	<p>Manual Removal: Hand pull individual plants and small infestations. Care should be taken when handling this plant due to the large, sharp thorns along the stems and branches. Chemical control: Control can be achieved by either grubbing out the seedlings or spraying with glyphosate and water 1:100 (10ml/1L) plus surfactant up to half a metre high. Shrubs can be cut and swabbed with a rate of 1 litre of glyphosate to 1.5 litres of water. Stem injecting is also possible on mature plants.</p>	<p>Flowering from autumn to spring, it reproduces from seed usually spread by birds and bats. It rapidly invades disturbed sites; for instance, where the ground was recently disturbed.</p>	<p>The Big Scrub Rainforest Landcare Group. 2019. Subtropical Rainforest Restoration</p>
<p>Lantana <i>Lantana camara</i></p>	<p>An integrated approach that uses a variety of control methods gives best results when dealing with Lantana (<i>Lantana camara</i>). A range of methods including, herbicides, mechanical removal, fire, biological control and re-vegetation should be used. Best results are obtained by working from areas of light infestation towards heavier infestation, and long-term follow-up control is required after initial attempts.</p>	<p>Chemical control: A variety of chemical controls are used to control Lantana and are described in detail in Stock (2009). The addition of penetrants and surfactants (adjuvants) to some herbicides may increase the herbicide absorption into the Lantana's sap system.</p> <ul style="list-style-type: none"> - Foliar sprays - Root application - Cut and paint method - Cut and scrape method - Basal bark application 	<p>Germination most frequently occurs following the first summer storms, but may occur at any time of the year when sufficient moisture is present and as soil temperature increases. Lantana can re-sprout from the base if the shoot dies, extending the life of individual plants. Lantana is allelopathic and can release chemicals into the surrounding soil which prevent germination and competition from some other plant species</p>	<p>NSW WeedWise QLD DAF Weeds Australia The Big Scrub Rainforest Landcare Group. 2019. Subtropical Rainforest Restoration</p>

Important Note: Herbicides in or around waterways

There are many restrictions on the use of herbicides in and around aquatic areas or areas that may drain into water courses. Always read the label and follow directions of the specific chemical being utilised. The type of chemical you use must be approved for aquatic use or under an Australian Pesticides and Veterinary Medicines Authority (APVMA) permit. Take extra care to avoid or minimise herbicide entering the water. Herbicide must be applied to the target plant material not any open body of water. Multiple factors can contribute to the specific technique used including proximity to waterway, topography, location to determine best practice methods.

3.8 Assisted Natural Regeneration (ANR)

Assisted Natural Regeneration (ANR) or bush regeneration of native forest ecosystems will utilise proven techniques to convert existing areas dominated by environmental weeds into native rainforest by providing suitable conditions for the germination of native plants from the existing seed bank and deposition.

Natural regeneration utilises the ecological processes of rainforest dynamics and the succession process. Following disturbance of a rainforest, the regeneration process progresses as part of the continuous redevelopment of species establishment and structural characteristics. This includes the basic premise of the following stages of vegetative growth:

- Pioneer species
- Secondary species
- Late secondary species
- Mature species

The seed bank is a critical factor for undertaking the assisted natural regeneration method. Seed dispersal provides another viable opportunity to introduce local seed into the site. Camphor Laurel left dead in situ provides excellent structural support for birds, bats and other animals to distribute seed. Other seeds are also transported by wind or water from nearby sources including remnants.

The site contains some areas which show positive potential for natural regeneration, while there are large areas containing thick coverage of exotic grasses with limited natural seedlings. There should be a good native rainforest seedbank in the soil considering nearby established rainforest trees and remnants.

Restricting grazing cattle access will allow for the establishment of rainforest species, however it will also allow exotic weed species such as Camphor Laurel to establish and potentially outgrow native species. Assisted natural regeneration will be a cost-effective method to restrict the dominance of exotic weed species and provide opportunities for native species to become established along the creek banks.

Primary methods include:

- Restrict cattle access to the creek areas either by fencing.
- Encourage existing native seedbank in the soil to germinate.
- Primary weed management application to utilise existing Camphor Laurel trees as a foundation to attract native seed dispersal.
- Secondary and follow up weed management application to prevent dominance by emerging weed seedlings.
- Additional tree plantings will be required to establish a canopy, which will also support natural regeneration by restricting weed infestations.

Following establishment of a native forest canopy and strengthened roots along the creek banks, the VMZ will require very little maintenance except for the occasional removal of sporadic weeds following disturbance events. Over time an established canopy will allow for a structured mid-storey and under-storey to develop that will further enhance the riparian corridor and improve the resilience of the habitat areas.

The vegetation management zones contain some large native species that will contribute to canopy cover and seed distribution throughout the area.

3.9 Revegetation Strategy

The revegetation strategy consists of additional rainforest plantings within the applicable Vegetation management zone (VMZ). It is required that a qualified and experienced bush regenerator undertakes and/ or oversees the ecological works, including native tree plantings, to ensure maximum survival rates.

For further detailed guidelines on species selection and planting techniques for subtropical rainforest, refer to *Big Scrub Landcare - Subtropical Rainforest Restoration – A practical manual and data source for Landcare groups, land managers and rainforest regenerators (2019)*.

Planting Model

A suitable planting model based upon rainforest ecology and the concept of succession should be employed in specific locations to ensure successful establishment depending upon soil type, topography, flooding potential, frost potential and other environmental factors.

Planting Layout and Density

Plantings should be spaced at between 2.5m – 3 m apart on average however this will vary around the property depending upon environmental characteristics. For example, the planting of wetland species along a watercourse would require a higher density, whereas planting secondary stage tree species as infill would require a much lower density.

The table below contains tree density and total area conversions to help with planning at specific locations on the property.

Table: Tree Density and Total Area Conversions

Tree Spacing (m)	1.5	1.8	2.0	2.5	3.0	3.5	4.0
Tree Density (per ha)	5,100	3,500	2,800	1,800	1,250	900	700
Tree Area (sqm)	2.0	2.9	3.5	5.6	8.0	11.0	14.4

Flora Species List

The primary goal in developing a suitable native species list is selecting species that are endemic to the Eureka locality. A useful source of this information can be obtained from the subject site and from nearby regrowth and remnant vegetation. Consultation with an experienced nursery is required. The attached flora list of the Midlands Remnant also provides a guide.

Plant Supply

Native plants should be sourced from local nurseries that produce high quality plants and have a good reputation. It is important that the plants are of local provenance and grown from local seed. Ordered trees should be in good health, free of disease and show signs of good root development and vigorous growth. Utilisation of seed from the site may be a viable technique.

Planting Techniques

Planting should take place during a time of year with good conditions for plant survival and growth. Plantings should be accompanied with quality mulching, fertilising and watering to ensure maximum chance of survival until the plants become established. It is recommended to do plantings from later summer through to autumn which has the most chance of rainfall and lower temperatures.

Maintenance

Maintaining the native plantings over a time period until a significant canopy is established will be required to reduce weed infestation and promote vigorous growth.

3.10 Adaptive Management

This VMP permits adaptive management provisions for the works schedule to be implemented over the 5-year period where environmental changes are occurring on-site during the working period. Adaptive management can respond to monitoring data that may suggest an alternative method is required to achieve the KPIs for the VMZ. If additional threatened species are identified during the ecological works, in particular during or following weed management works, which will require an adaptive management response to ensure they are protected. Adaptive management allows for suitable changes to be made to the works schedule, if the changes result in higher efficiency or success of achieving the key performance indicators and outcomes of the plan.

3.11 Bushfire Management

The property is identified as being bushfire prone, therefore Asset Protection Zones (APZs) are required for the proposed dwellings. The designated APZs require the management of vegetation surrounding the dwelling site. The proposal recognises the importance of conserving native flora and preventing soil erosion and will employ measures to ensure fuel reduction practices and the ongoing maintenance of APZs is conducted appropriately. Any additional landscaped gardens within APZs should comply with Planning for Bushfire Protection requirements.

The proposed ecological works should be conducted in a manner that complies with Bushfire Management and 'NSW Planning for Bushfire Protection 2019'. The bushfire assessment report submitted with the Development Application and associated Bushfire Management Illustration demonstrates the required Asset Protection Zones for each dwelling site are well outside any VMZ or area of native vegetation and will not result in negative impacts on ecological values.

Asset Protection Zones

An Asset Protection Zone (APZ) is an area surrounding a building, such as a dwelling or associated building, where fuel is managed and reduced for bushfire risk purposes. The area requires a reduction in available vegetation that may be flammable during a bushfire situation, therefore the APZ contains reduced fuel that may reduce the severity or impact of a bushfire onto the building. The APZ does not require removal of all vegetation, it does permit some trees to remain in most situations however, there should be limited connectivity between trees and the understorey should be highly managed.

A properly managed APZ (Figure 12) will contain:

- 'Buffer zone' surrounding the main dwelling and associated buildings (vegetation);
- Provide an area for occupants to move to safe location away from a bushfire; and
- Access for Rural Fire Service personnel to defend property and assets.

Inner and outer protection areas - example designs

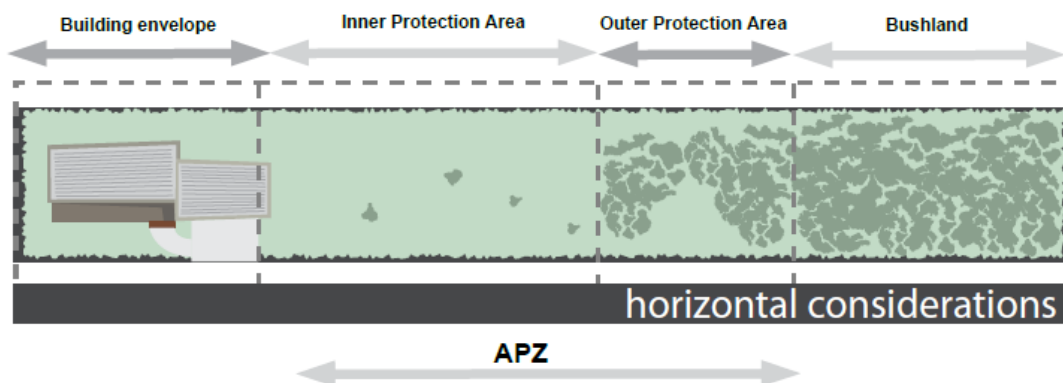


Figure 12: APZ Diagram

3.12 Outcomes

- Existing native flora including HEV Vegetation and the Midlands Big Scrub Remnant is protected for the long-term;
- Camphor Laurel are removed from the management zones and considerably reduced throughout the entire property over the long-term;
- Environmental weeds such as Lantana, Small-leaved Privet and Devils Fig are removed from designated areas of the site;
- Native species are established and replicate the species diversity of original forest ecosystems before European settlement;
- Natural forest regeneration is encouraged and facilitated;
- Established canopy that promotes suitable microclimate and understorey habitat;
- Restored riparian zone and reduced erosion leading to enhanced water catchment and key fish habitat values;
- Wildlife corridors and threatened species habitat enhanced including increased connectivity;
- Asset Protection Zones implemented and managed according to recommendations whilst still protecting native vegetation;
- Mixed land uses operate in harmony with site ecological enhancement; and
- Increased delivery of ecosystem services to the Byron Shire.

3.13 Monitoring and Reporting

The ecological works schedule requires ongoing monitoring and reporting to ensure that environmental repair and enhancement works are progressing as anticipated. Monitoring data will be collected throughout the implementation of the plan so that progress can be measured against final KPIs.

Monitoring

Monitoring will be ongoing and comprehensive inspections will be conducted every 12 months to assess and evaluate the ongoing condition of designated VMZs compared to the baseline. This task requires recording data on native vegetation health, weed management and additional tree plantings. Geo-located photographs will provide a visual means to assess changes over time.

Monitoring points will be designated within the VMZs where base data collection for ecological condition should be collected prior to any ecological works being started. Data can then be compared to annual monitoring data which provides for an ongoing, cyclic review system that can feed back into the adaptive management strategy.

Daily recording sheets should be used to monitor environmental repair and enhancement works:

- Weed management and herbicide usage
- Plant species list
- Planting and environmental works activity sheets

The following professional toolkit provides a comprehensive set of tools and recording sheets that contains scientific rigorous methodology:

Monitoring Revegetation Projects in Rainforest Landscapes. Toolkit Version 3.

(*Kanowski et al. 2010, Griffith University*)

Reporting

Certified progress reports and an independent certified final audit report are to be provided to Byron Shire Council:

Table 10: Reporting Requirements

Certified Report	Submission	Content
Baseline Report	Year 1	Provides baseline geo-tagged photos of each monitoring station. Includes a description of the existing vegetation, site characteristics and environmental conditions.
Annual Monitoring Report	Year 1, 2, 3, 4	Provide details on progress of the VMP and achieved performance criteria. Includes details on contract agreements organised, detailed species planting list, specific locations, planting density, weed control activities and protection measures. Multiple photo points set up on the property within VMZs to monitor ongoing VMP works.
Final Evaluation Report	Year 5	Following the completion of the implemented VMP, to contain a final audit of ecological works by an independent consultant.

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Biodiversity Assessment Method Training 2018

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APPENDIX A: Byron Shire Council Planning Controls

Byron Development Control Plan 2014

D2.6 Multiple Occupancy Development

Multiple Occupancy has historically been a preferred way of living in the rural areas of Byron Shire. The following controls have been prepared to implement the Aims, Guiding Principles, Best Practice Guidelines and Performance Standards of the Byron Rural Settlement Strategy 1998 relating to Multiple Occupancy Development.

Prescriptive Measures

6. Vegetation Management Plan

- a) Multiple Occupancy development is to include an element of environmental repair and enhancement based on **900 trees per dwelling house**. Such repair is to be focused on the expansion of wildlife corridors, restoring and reconnecting vegetation remnants, and enhancing riparian areas and habitat for threatened species and endangered plant communities. Other measures as appropriate may be recommended by Council in lieu of this.
- b) Where properties are significantly infested by woody weeds (e.g. camphor laurel, lantana etc) Council will consider requests to undertake environmental repair and enhancement activities based on weed control and assisted natural regeneration and a lesser number of trees to be planted where it can be demonstrated that the proposal will have a similar positive environmental impact to planting 900 trees per dwelling house.
- c) Council will also consider requests to undertake environmental repair and enhancement activities on other rural sites within the Shire (instead of on the land the subject of the application) where it can be demonstrated that the subject land:
 - i) contains adequate native vegetation cover not threatened by competitive/ inhibiting weed or noxious plant invasion and requires no further environmental repair and enhancement activities; or
 - ii) contains existing reforestation works undertaken as part of a long term program and where such works can be substantiated to Council's satisfaction; or
 - iii) notwithstanding the vegetation attributes of the land, the applicant identifies a higher priority location in the same local catchment area requiring urgent environmental repair and enhancement and that Council agrees to such a location.

<p>Note: Where an applicant seeks to carry out environmental repair and enhancement work on another rural property, the consent from the land owner is to be submitted with the Development Application.</p>
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- d) Applications for Multiple Occupancy Development are to include a vegetation management plan detailing the revegetation and/or restoration program to be carried out over a period of at least five (5) years, with ongoing maintenance, protection and management in perpetuity thereafter.

The vegetation management plan (VMP) must detail where 900 local native trees per dwelling or share are to be planted as environmental repair and enhancement for development. VMP's must be prepared by a qualified and experienced bush regenerator (Certificate 4 in Natural Area Restoration/Conservation and Land Management) or ecologist with specific knowledge and experience in Restoration Ecology and in accordance with the Guidelines for VMP/Biodiversity Conservation Management Plan (BCMP)/Environmental Enhancement Management Plan (EEMP), available on Council's website. Baseline monitoring and permanent monitoring points must be included with the VMP and restored or planted areas will have conditions imposed that the BMP area must be retained in perpetuity.

Equivalent ecological restoration may be provided where existing native vegetation occurs on site. It is preferred that remnant vegetation on site is restored to a local native plant community type before additional planting is undertaken. Weed control should prioritise invasive species and weeds of national significance (WONS). The area of restoration to be completed in place of planting is to be calculated as follows.

- i) Calculate the area required to plant 900 trees per residence/share using the appropriate plant spacings for the vegetation community to be established. For example, rainforest species are generally planted 2 to 3m apart, thus 900 trees would occupy an area of some 0.56ha at spacings of 2.5m (using the table below); while koala habitat restoration or eucalypt/sclerophyll plant communities naturally have spacings between 4m and 6m apart so that 900 trees would occupy an area of 1.44ha.

Table D2.1 - Tree Spacing Numbers / Hectare (Ha)

No of Trees per Ha	Spacing
10,000	@ 1.0metre spacing
4,444	@ 1.5metre spacing
2,500	@ 2.0metre spacing
1,600	@ 2.5metre spacing
1,111	@ 3.0metre spacing
816	@ 3.5metre spacing
625	@ 4.0metre spacing
400	5 metre spacings
25	20 metre spacings
16	25 metre spacings
11	30 metre spacings
4	50 metre spacings

- ii) For areas that are clearly dominated by weed species (greater than 50% cover over all stratum), the total restoration area is double that calculated in point a) above. For areas that are weedy, but not weed-dominated (less than 50% cover all stratum), the restoration area worked is four times that calculated above. These calculations ensure that equivalent effort is expended whether planting or restoring existing plant communities.

APPENDIX B: Climate Information

Climate data from Byron Bay (Cape Byron AWS) (Source: Australian BOM 2021)

Month	Mean Maximum Temperature (°C)	Mean Minimum Temperature (°C)	Mean Rainfall (mm)	Mean No. of Wet Days
January	28.0	21.3	156	10.5
February	27.5	21.2	193	12.9
March	26.6	20.1	168	12.7
April	24.0	17.7	162	11.5
May	21.4	15.1	94	10
June	19.3	13.2	163	11
July	18.9	12.4	84	8.2
August	20.2	13.2	68	5.4
September	22.1	15.3	49	5.7
October	23.7	17	89	8.7
November	25.3	18.7	89	8.0
December	26.7	20	128	10.3
YEAR AVERAGE	23.6	17.1	1473.2	108.6

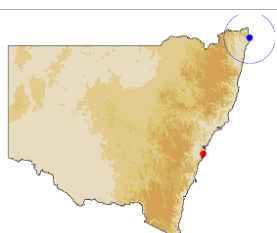
Site name: BYRON BAY (CAPE BYRON AWS)

Site number: 058216

Latitude: 28.64 °S Longitude: 153.64 °E

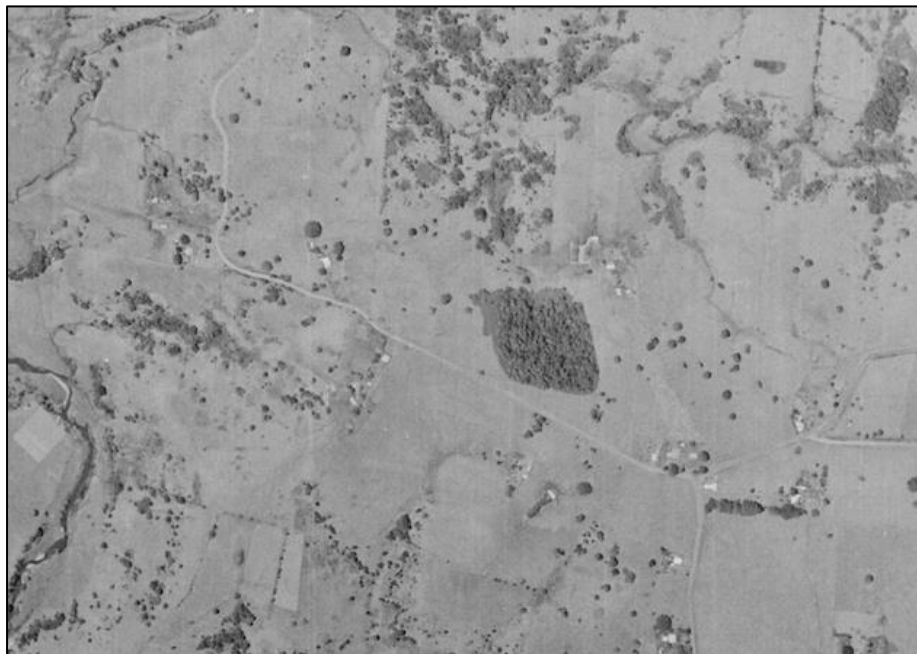
Elevation: 95 m

Commenced: 1994 Status: Open



APPENDIX C: Historic Aerial Photographs

Aerial Photograph (1958)



Source: NSW Spatial Services

Aerial Photograph (1966)



Source: NSW Spatial Services

Aerial Photograph (1991)



Aerial Photograph (2006)



APPENDIX D: Vegetation Map








**16 Whian Road
Eureka
Lot 25 DP 1102773**

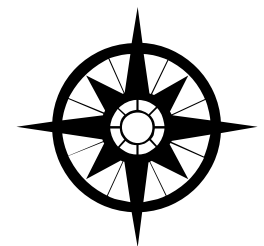
Proposed Multiple Occupancy

**Illustration 5:
Vegetation**



Legend

-  Lot
-  Subject Site
-  Watercourse
-  Drainage Gully
-  Contour (10m)
-  Vegetation Community
-  Tree GPS



Scale: A3
Datum: GDA94
Projection: MGA Zone 56

1:3,000

Data Source:
Cadastral, Topographic Data: LPI NSW 2021
LiDAR Data: NSW Spatial Services
Imagery: Nearmap 2021

Date: March 2022

Version A

LGA: Byron

Parish: Clunes



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APPENDIX E: Flora Species List (Preliminary)

Overall Property - Native Species

Scientific Name	Common Name
<i>Acacia melanoxylon</i>	Sally Wattle/Blackwood
<i>Acmena ingens</i>	Red Apple
<i>Alphitonia excelsa</i>	Red Ash
<i>Araucaria cunninghamii</i>	Hoop Pine
<i>Archontophoenix cunninghamiana</i>	Bangalow Palm
<i>Asplenium australasicum</i>	Bird's Nest Fern
<i>Capparis arborea</i>	Brush caper berry
<i>Castanospermum australe</i>	Black Bean
<i>Cissus antarctica</i>	Water Vine
<i>Cryptocarya obovata</i>	Pepperberry Tree
<i>Cyathea leichhardtiana</i>	Prickly Treefern
<i>Diospyros pentamera</i>	Myrtle Ebony
<i>Diploglottis australis</i>	Native Tamarind
<i>Dysoxylum mollissimum</i>	Red Bean
<i>Elaeocarpus grandis</i>	Blue Quandong
<i>Elaeocarpus obovatus</i>	Hard Quandong
<i>Ficus coronata</i>	Creek Sandpaper Fig
<i>Ficus fraseri</i>	Sandpaper Fig
<i>Ficus macrophylla</i>	Moreton Bay Fig
<i>Ficus watkinsiana</i>	Strangling Fig
<i>Flindersia schottiana</i>	Cudgerie
<i>Glochidion ferdinandi</i>	Cheese Tree
<i>Guioa semiglauca</i>	Guioa
<i>Grevillea robusta</i>	Silky Oak
<i>Jagera pseudorhus</i>	Foambark
<i>Lomandra sp.</i>	Lomandra
<i>Maclura cochinchinensis</i>	Cockspur Thorn
<i>Mallotus philippensis</i>	Red Kamala
<i>Pittosporum undulatum</i>	Sweet Pittosporum
<i>Platycerium bifurcatum</i>	Elkhorn
<i>Platycerium superbum</i>	Staghorn
<i>Synoum glandulosum</i>	Scentsless Rosewood
<i>Syzygium smithi</i>	Lilly Pilly
<i>Toona ciliata</i>	Red Cedar

Overall Property - Exotic Species

Scientific Name	Common Name
<i>Ageratina riparia</i>	Mistweed
<i>Ageratum houstonianum</i>	Blue Billy Goat Weed
<i>Ambrosia artemisiifolia</i>	Annual Ragweed
<i>Bidens pilosa</i>	Farmers Friend
<i>Cinnamomum camphora</i>	Camphor Laurel
<i>Lantana camara</i>	Lantana
<i>Ligustrum lucidum</i>	Large-leaf Privet
<i>Ligustrum sinense</i>	Small-leaf Privet
<i>Senna pendula var. glabrata</i>	Easter Senna
<i>Solanum mauritianum</i>	Wild Tobacco Bush
<i>Solanum chrysotrichum</i>	Giant Devils Fig
<i>Solanum sp.</i>	Devils Apple

Midland Remnant – Species List

Scientific Name
<i>Tinospora tinosporoides</i>
<i>Rhodamnia rubescens</i>
<i>Trichosanthes subvelutina</i>
<i>Cupaniopsis newmanii</i>
<i>Uvaria leichhardtii</i>
<i>Alstonia constricta</i>
<i>Pothos longipes</i>
<i>Polyscias elegans</i>
<i>Calamus muelleri</i>
<i>Linospadix monostachyos</i>
<i>Pararistolochia praevenosa</i>
<i>Marsdenia rostrata</i>
<i>Ehretia acuminata</i> var. <i>acuminata</i>
<i>Pollia crispate</i>
<i>Diospyros pentamera</i>
<i>Elaeocarpus obovatus</i>
<i>Sloanea australis</i>
<i>Actephila lindleyi</i>
<i>Bridelia exaltata</i>
<i>Mallotus discolor</i>
<i>Mallotus philippensis</i>
<i>Castanospermum austral</i>
<i>Cryptocarya obovate</i>
<i>Cryptocarya triplinervis</i>
<i>Endiandra muelleri</i>
<i>Endiandra pubens</i>
<i>Litsea australis</i>
<i>Litsea reticulata</i>
<i>Neolitsea dealbata</i>
<i>Dysoxylum fraserianum</i>
<i>Dysoxylum mollissimum</i> subsp. <i>Mole</i>
<i>Dysoxylum rufum</i>
<i>Wilkiea austroqueenslandica</i>
<i>Wilkiea huegeliana</i>
<i>Ficus fraseri</i>
<i>Maclura cochinchinensis</i>
<i>Acmena ingens</i>
<i>Acmena smithii</i>
<i>Lophostemon confertus</i>
<i>Syzygium corynanthum</i>
<i>Syzygium crebrinerve</i>
<i>Syzygium francisii</i>
<i>Pittosporum multiflorum</i>
<i>Stenocarpus sinuatus</i>
<i>Triunia youngiana</i>
<i>Acronychia pubescens</i>
<i>Flindersia australis</i>
<i>Flindersia schottiana</i>
<i>Flindersia xanthoxyla</i>
<i>Pentaceras austral</i>

<i>Arytera distylis</i>
<i>Jagera pseudorhus</i>
<i>Toechima dasyrrhache</i>
<i>Ailanthus triphysa</i>
<i>Petermannia cirrose</i>
<i>Ripogonum discolor</i>
<i>Brachychiton acerifolius</i>
<i>Commersonia bartramia</i>
<i>Dendrocide excelsa</i>
<i>Sarcopteryx stipata</i>
<i>Alpinia caerulea</i>
<i>Archontophoenix cunninghamiana</i>
<i>Trophis scandens</i>
<i>Sarcomelicope simplicifolia</i>
<i>Cupaniopsis flagelliformis</i>
<i>Toona ciliate</i>
<i>Amyema congene</i>
<i>Guioa semiglauca</i>
<i>Flagellaria indica</i>
<i>Callerya megasperma</i>
<i>Ficus obliqua</i>
<i>Cupaniopsis newmanii</i>
<i>Diploglottis australis</i>
<i>Ficus coronata</i>
<i>Alphitonia excelsa</i>
<i>Glochidion ferdinandi</i>
<i>Cordyline rubra</i>
<i>Arthropteris beckler</i>
<i>Platycerium superbum</i>
<i>Pyrrosia confluens var. confluens</i>
<i>Pteris tremula</i>
<i>Cyclosorus dentatus</i>
<i>Melia azedarach</i>
<i>Neolitsea australiensis</i>
<i>Argyrodendron trifoliolatu</i>
<i>Anthocarapa nitidula</i>
<i>Alocasia brisbanensis</i>
<i>Lastreopsis marginans</i>
<i>Cinnamomum camphora</i>
<i>Ligustrum lucidum</i>
<i>Solanum mauritianum</i>
<i>Lantana camara</i>

APPENDIX F: Atlas of NSW Wildlife – Threatened Species

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria: Public Report of all Valid Records of Threatened (listed on BC Act 2016) or Commonwealth listed Entities in selected area [North: -28.63 West: 153.39 East: 153.49 South: -28.73] returned a total of 1,178 records of 47 species. Updated 30/11/2021.

Yellow = May exist on the site, Green = Recorded on the site

Kingdom	Class	Family	Species Code	Scientific Name	Common Name	NSW status	Comm. status	Records
Animalia	Amphibia	Myobatrachidae	3007	<i>Assa darlingtoni</i>	Pouched Frog	V,P		4
Animalia	Reptilia	Elapidae	2677	<i>Hoplocephalus stephensii</i>	Stephens' Banded Snake	V,P		1
Animalia	Aves	Casuariidae	0001	<i>Dromaius novaehollandiae</i>	Emu population in the New South Wales North Coast Bioregion	E2,P		1
Animalia	Aves	Columbidae	0025	<i>Ptilinopus magnificus</i>	Wompoo Fruit-Dove	V,P		16
Animalia	Aves	Columbidae	0021	<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove	V,P		29
Animalia	Aves	Columbidae	0023	<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V,P		2
Animalia	Aves	Podargidae	0314	<i>Podargus ocellatus</i>	Marbled Frogmouth	V,P		1
Animalia	Aves	Apodidae	0334	<i>Hirundapus caudacutus</i>	White-throated Needletail	P	V,C,J,K	4
Animalia	Aves	Ardeidae	0196	<i>Ixobrychus flavicollis</i>	Black Bittern	V,P		1
Animalia	Aves	Accipitridae	0226	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V,P		1

Kingdom	Class	Family	Species Code	Scientific Name	Common Name	NSW status	Comm. status	Records
Animalia	Aves	Accipitridae	0225	<i>Hieraaetus morphnoides</i>	Little Eagle	V,P		1
Animalia	Aves	Rallidae	0053	<i>Amaurornis moluccana</i>	Pale-vented Bush-hen	V,P		1
Animalia	Aves	Cacatuidae	0265	<i>^Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V,P,2		3
Animalia	Aves	Monarchidae	0376	<i>Carterornis leucotis</i>	White-eared Monarch	V,P		1
Animalia	Aves	Petroicidae	0380	<i>Petroica boodang</i>	Scarlet Robin	V,P		1
Animalia	Mammalia	Dasyuridae	1008	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V,P	E	3
Animalia	Mammalia	Dasyuridae	1045	<i>Planigale maculata</i>	Common Planigale	V,P		1
Animalia	Mammalia	Phascolarctidae	1162	<i>Phascolarctos cinereus</i>	Koala	V,P	V	721
Animalia	Mammalia	Petauridae	1137	<i>Petaurus norfolcensis</i>	Squirrel Glider	V,P		4
Animalia	Mammalia	Potoroidae	1175	<i>Potorous tridactylus</i>	Long-nosed Potoroo	V,P	V	2
Animalia	Mammalia	Pteropodidae	1280	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V,P	V	15
Animalia	Mammalia	Vespertilionidae	1357	<i>Myotis macropus</i>	Southern Myotis	V,P		2
Animalia	Mammalia	Vespertilionidae	1336	<i>Nyctophilus bifax</i>	Eastern Long-eared Bat	V,P		8
Animalia	Mammalia	Miniopteridae	1346	<i>Miniopterus australis</i>	Little Bent-winged Bat	V,P		1

Kingdom	Class	Family	Species Code	Scientific Name	Common Name	NSW status	Comm. status	Records
Animalia	Insecta	Noctuidae	I021	<i>Phyllodes imperialis southern subspecies</i>	Southern Pink Underwing Moth	E1	E	1
Plantae	Flora	Acanthaceae	7310	<i>Isoglossa eranthemoides</i>	Isoglossa	E1	E	22
Plantae	Flora	Apocynaceae	1233	<i>Marsdenia longiloba</i>	Slender Marsdenia	E1	V	1
Plantae	Flora	Apocynaceae	1176	<i>Ochrosia moorei</i>	Southern Ochrosia	E1	E	10
Plantae	Flora	Cunoniaceae	10943	<i>Davidsonia jerseyana</i>	Davidson's Plum	E1,2	E	2
Plantae	Flora	Fabaceae (Caesalpinioideae)	8772	<i>Senna acclinis</i>	Rainforest Cassia	E1		2
Plantae	Flora	Fabaceae (Faboideae)	2833	<i>Desmodium acanthocladum</i>	Thorny Pea	V	V	38
Plantae	Flora	Fabaceae (Mimosoideae)	7757	<i>Archidendron hendersonii</i>	White Lace Flower	V		1
Plantae	Flora	Lauraceae	8480	<i>Endiandra muelleri subsp. bracteata</i>	Green-leaved Rose Walnut	E1		1
Plantae	Flora	Meliaceae	3682	<i>Owenia cepiodora</i>	Onion Cedar	V	V	9
Plantae	Flora	Menispermaceae	3691	<i>Tinospora tinosporoides</i>	Arrow-head Vine	V		57
Plantae	Flora	Myrtaceae	4283	<i>Rhodamnia rubescens</i>	Scrub Turpentine	E4A		8
Plantae	Flora	Myrtaceae	4284	<i>Rhodomyrtus psidioides</i>	Native Guava	E4A		2
Plantae	Flora	Myrtaceae	4290	<i>Syzygium hodgkinsoniae</i>	Red Lilly Pilly	V	V	25

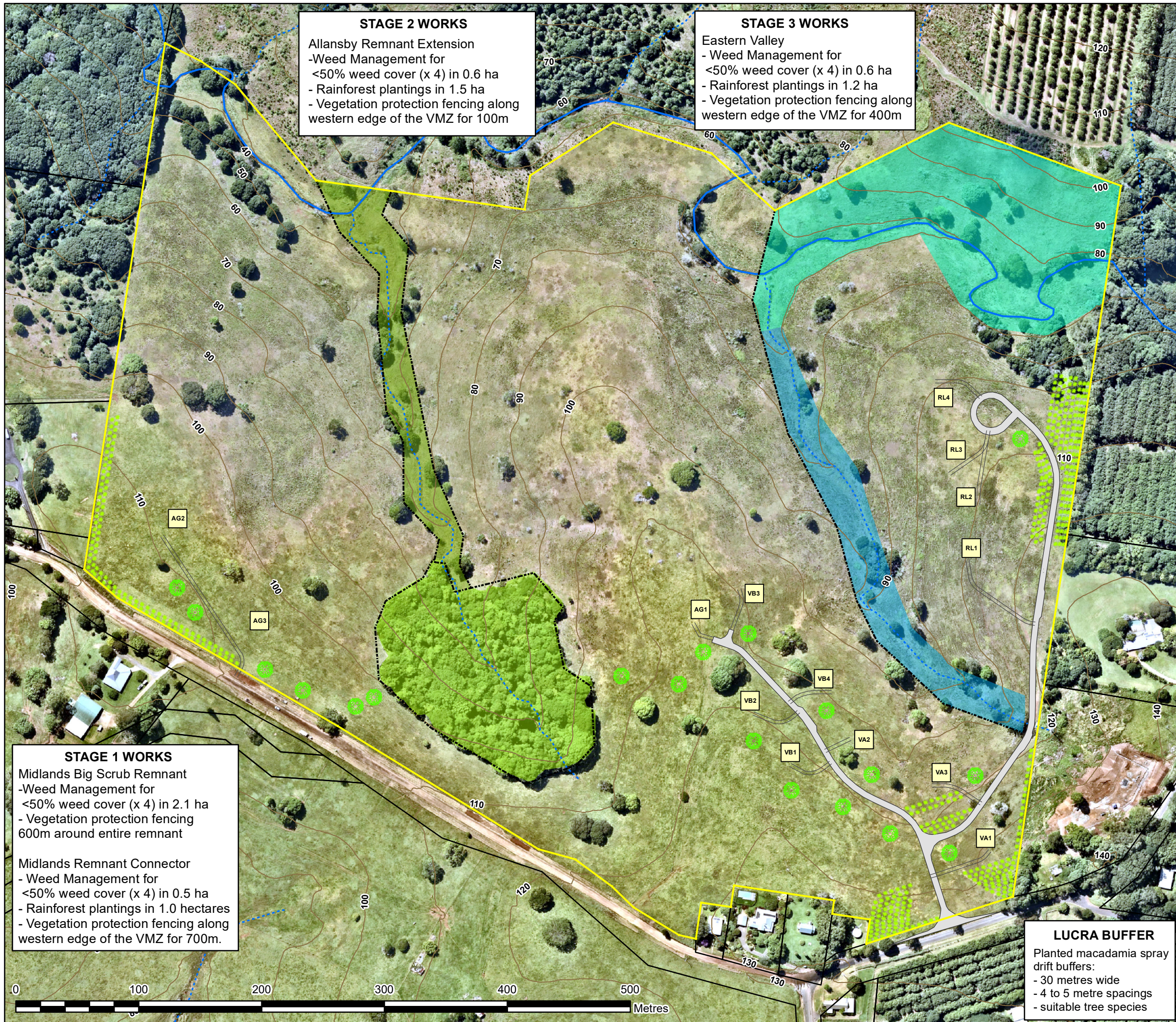
Kingdom	Class	Family	Species Code	Scientific Name	Common Name	NSW status	Comm. status	Records
Plantae	Flora	Myrtaceae	4292	<i>Syzygium moorei</i>	Durobby	V	V	28
Plantae	Flora	Phyllanthaceae	9833	<i>Phyllanthus microcladus</i>	Brush Sauropus	E1		1
Plantae	Flora	Poaceae	4776	<i>Arthraxon hispidus</i>	Hairy Jointgrass	V	V	2
Plantae	Flora	Proteaceae	5354	<i>Floydia praealta</i>	Ball Nut	V	V	11
Plantae	Flora	Proteaceae	5432	<i>Hicksbeachia pinnatifolia</i>	Red Boppel Nut	V	V	118
Plantae	Flora	Proteaceae	9680	<i>Macadamia integrifolia</i>	Macadamia Nut		V	2
Plantae	Flora	Proteaceae	5446	<i>Macadamia tetraphylla</i>	Rough-shelled Bush Nut	V	V	10
Plantae	Flora	Sapindaceae	5889	<i>Diploglottis campbellii</i>	Small-leaved Tamarind	E1,2	E	2
Plantae	Flora	Sapotaceae	11957	<i>Niemeyera whitei</i>	Rusty Plum, Plum Boxwood	V		1

APPENDIX G: Vegetation Management Plan

**16 Whian Road
Eureka
Lot 25 DP 1102773**

Proposed Multiple Occupancy

**Illustration 7:
Vegetation Management Plan**



STAGE 2 WORKS
Allansby Remnant Extension
- Weed Management for <50% weed cover (x 4) in 0.6 ha
- Rainforest plantings in 1.5 ha
- Vegetation protection fencing along western edge of the VMZ for 100m

STAGE 3 WORKS
Eastern Valley
- Weed Management for <50% weed cover (x 4) in 0.6 ha
- Rainforest plantings in 1.2 ha
- Vegetation protection fencing along western edge of the VMZ for 400m

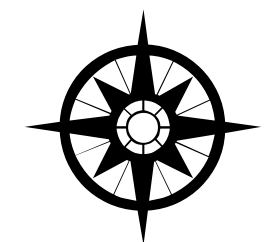
STAGE 1 WORKS
Midlands Big Scrub Remnant
- Weed Management for <50% weed cover (x 4) in 2.1 ha
- Vegetation protection fencing 600m around entire remnant

Midlands Remnant Connector
- Weed Management for <50% weed cover (x 4) in 0.5 ha
- Rainforest plantings in 1.0 hectares
- Vegetation protection fencing along western edge of the VMZ for 700m.

LUCRA BUFFER
Planted macadamia spray drift buffers:
- 30 metres wide
- 4 to 5 metre spacings
- suitable tree species

Legend

- Lot
- Subject Site
- Contour (10m)
- Access Road
- Driveway
- Dwelling Cluster 160m D.
- Dwelling Site (15m x 15m)
- Planted Vegetation Buffer
- Planted Shade Tree
- Proposed Fence
- Midlands Big Scrub Remnant (2.1 ha)
- Midlands Remnant Connector (1.0 ha)
- Allansby Remnant Extension (3.0 ha)
- Eastern Valley (1.2 ha)



Scale: A3
Datum: GDA94
Projection: MGA Zone 56

1:3,000

Data Source:
Cadastral, Topographic Data: LPI NSW 2021
LiDAR Data: NSW Spatial Services
Imagery: Nearmap 2021

Date: November 2023

Version B

LGA: Byron

Parish: Clunes

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