APPENDIX H VMP – Seascape Grove – Feb 2020

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SUSTAINABLE PARTNERSHIPS
DEDICATED TO ACHIEVING
ECOLOGICAL AND ECONOMICAL BALANCE

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MANAGEMENT

VEGETATION MANAGEMENT PLAN FOR SEASCAPE GROVE

SOUTH WEST ROCKS

February 2020

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1. Background Information

1.1 Introduction

Biodiversity Australia Pty Ltd was commissioned by B&M Walls ('the client') to prepare a Vegetation Management Plan (VMP) for Seascape Grove Estate, Belle O'Connor Street, South West Rocks.

This VMP has been prepared to address the requirements of Stage 1C of the major project (approval no 07_0129) and provides required works and actions plans for vegetation management and monitoring works across all stages of the approved development.

1.2 Location of the Subject Land

The subject land comprises a 30ha parcel of land located at South West Rocks and is accessed from Belle O'Connor Street (Figure 1).

The subject land is the location of an approved residential subdivision over an area of 23ha. The subdivision commenced in 2004 and a number of Lots in the north have been developed along with roads and landscaping.

A development application has been recently approved for creation of a dwelling envelope and APZ in Lot 800 which is located in the southwest of the subject land. The application is referred to as T6-19-266.

1.3 Approved Subdivision and Lot 800 DA

In 2004, Lot 2 DP645213 (Waldel Park) was granted approval by Kempsey Shire Council under the provisions of *State Environmental Planning Policy No. 71 – Coastal Protection* for a 23 Lot residential subdivision. All approved Lots were released in 2006 and are currently occupied by residential dwellings.

A master plan was approved by the Minister for Planning in March 2006 and confirmed via the approval of two separate Major Projects.

Major Project 05_0018 granted consent to a further 108 Lots in six separate stages, primarily located within the north-eastern portion of the site. The Lots granted under this consent were identified as Stage 1B.

Major Project 07_0129 granted consent to a further 54 residential Lots., one lot for integrated housing and one lot for environmental protection (being Lot 800). This Stage was identified as Stage 1C and was granted to occur in several separate stages. Stage one of the subdivision has been completed, with Stage 2 to commence shortly. The subdivision layout plan is shown in Figure 2.

The R1 General Residential zone covers an area of 22.8ha. The on-site conservation areas contained within the E3 Environmental Management Zone (Lot 800) cover an area of 5.9ha.

The development includes establishment of roads, site drainage and stormwater retention basins, and Asset Protection Zones (APZ).

1.4 Requirements for the VMP

Condition B21 of the Major Project 07_0129 approval for the subdivision requires preparation of a Vegetation Management Plan (VMP). The requirements of the VMP are listed in the following table along with the section within the plan that they are addressed.

The VMP largely applies to Lot 800 in the southwest of the site, however some requirements apply to Stage 2 of the subdivision.

Table 1: VMP requirements

VMP Requirement as per Approval	Section Addressed
The mechanism by which the regeneration area will be delivered and upheld in perpetuity	6.3
Specific environmental objectives	3.1
The measurable environmental outcomes that will be achieved	3.2
Gantt chart or similar clearly outlining the activity, costing and timing of vegetation management actions monitoring and review details	5 and 6.5
Details of an appropriate ecological fire regime (in consultation with the RFS)	4.3.2
Details for the control of feral and domestic animals, as well as disease such as *Phytophthora cinnamomi*	4.3.4 and 4.3.5
Nest box location and management	4.2.6.4.1
Details of methods for the protection of fauna from cars along Burrawong Drive	4.3.3
Specifications for ongoing protection of the vegetation from impacts associated with adjacent residential areas (including human visitation)	4.3.4.3
Mapping and photographs of vegetation condition/weed cover as a baseline from which site rehabilitation/management can be measured	2.2 and 2.3
Educational/regulatory style signage	4.3.4.3
A bush regeneration plan including: – a requirement to retain all standing and fallen timber – details on how weeds will be controlled details on the supplementary planting of local indigenous native vegetation species. – the period and methodology for bush regeneration	4.2
Performance criteria by which compliance will be measured for the implementation of the above.	3.2 and 4.2.3
Monitoring requirements	6.1

Figure 1: Location of the subject land

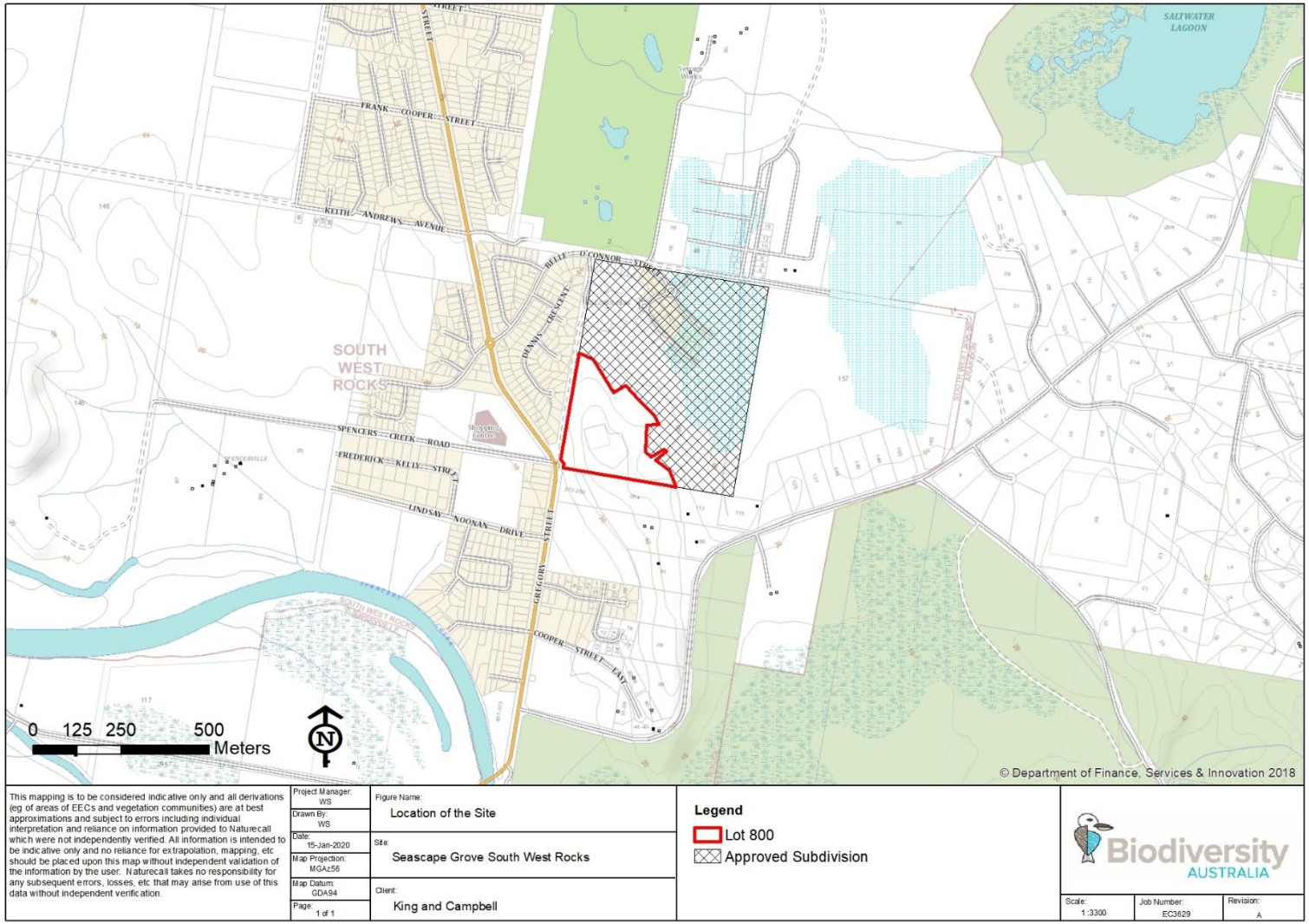


Figure 2: Development layout plan

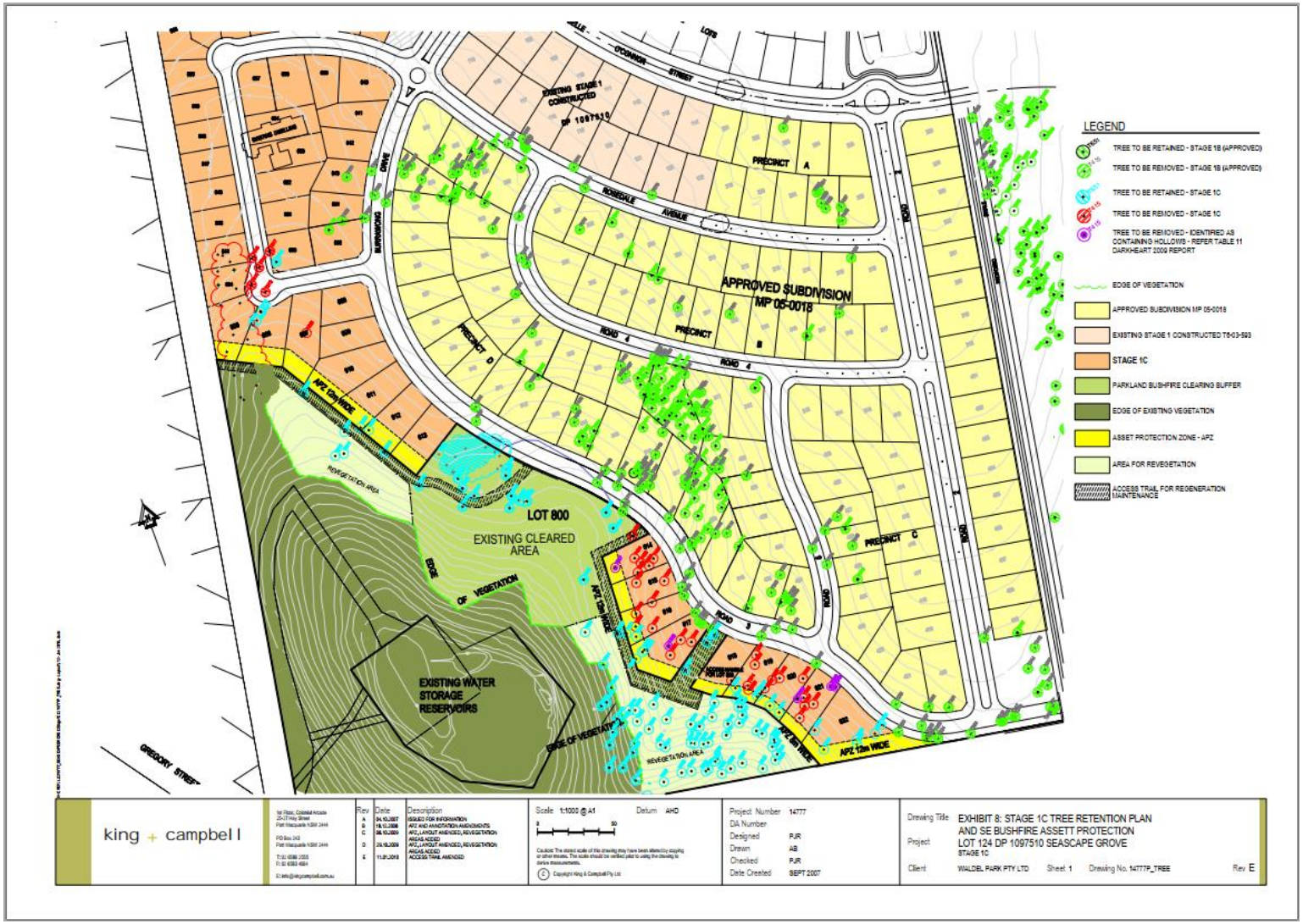
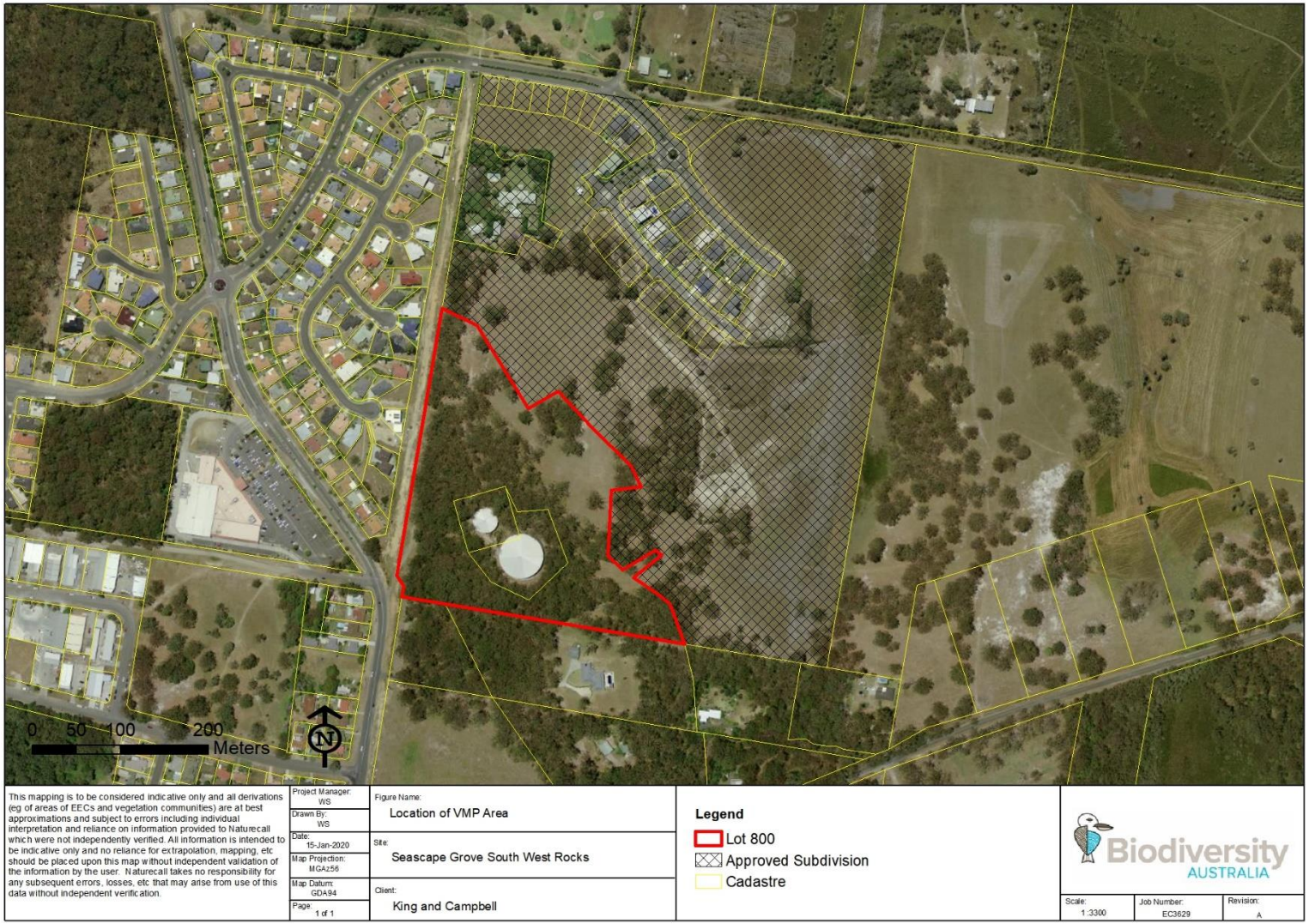


Figure 3: Location of Lot 800 and VMP area



2. Existing Site Conditions

2.1 Topography, Soils and Geology

The site is located in a northeast facing hillslope and ranges in elevation form <10 in the north to 40m in the southwest. The north eastern part of the site is generally level and drains to the north.

Soil landscape mapping shows that the site is underlain by Swamp and Aeolian soils in the low lying areas to Residual and Erosional soils in elevated areas in the south. These form part of the Clybucca, Korogoro and Big Smoky soil landscapes (Atkinson 1990), as shown in Figure 4.

2.2 Vegetation Communities

The subject land predominantly comprises cleared grazing land and scattered trees. The southwestern portion of the site including Lot 800 contains a derived woodland and a dry sclerophyll forest community dominated by Scribbly Gum, Large-fruited Blackbutt and Needlebark Stringybark. This aligns with the NSW Plant Community Type *Scribbly Gum - Needlebark Stringybark heathy open forest of coastal lowlands of the northern NSW.*

Parts of this community have been underscrubbed and are grazed by horses, while other areas are in a more natural state and contain intact understorey, shrubs and ground cover layers. An updated vegetation community map for Lot 800 has been produced and is shown in Figure 5 below. Photos 1-3 illustrate the site vegetation communities and their current condition.

Photo 1: Pasture Grassland

Photo 2: Derived Woodland

Photo 3: Dry sclerophyll forest

Figure 4: Soil processes

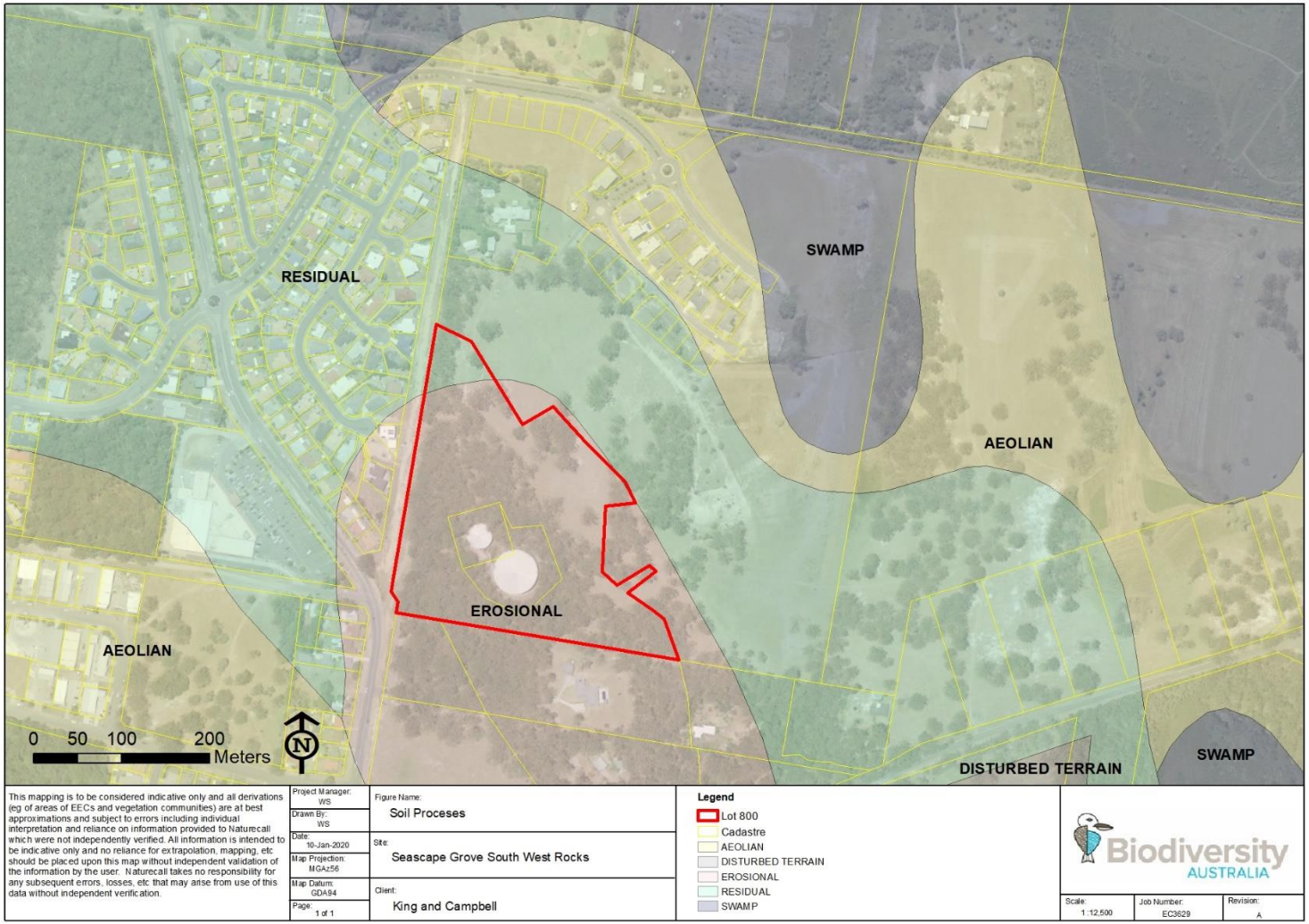


Figure 5: Updated site vegetation mapping

2.3 Weed Cover

Weed cover across the site is generally low and limited to common pasture weeds, exotic grasses and occasional patches of Lantana and Blackberry.

The areas of pasture grassland and woodland have a moderate to high cover of exotic species including Common Paspalum, Catsear, Quaking Grass, Fleabane, Fireweed, Cobblers Pegs and Coolatai Grass. Grassland areas also contain occasional patches of Blackberry and Lantana which have been supressed through grazing horses (Photo 4).

The intact bushland areas within Lot 800 have a low level of weed cover. The only weeds noted in these areas comprised occasional patches of Lantana and Bitou Bush and a few Camphor Laurel saplings.

The weeds recorded within Lot 800 are listed within table 2. Current weed cover mapping for the site is shown in Figure 6.

The following Biosecurity Act listed weeds were recorded on the site:

- Lantana
- Blackberry
- Bitou Bush
- Fireweed
- Coolatai Grass
- Whiskey Grass

Table 2: Weed list for Lot 800

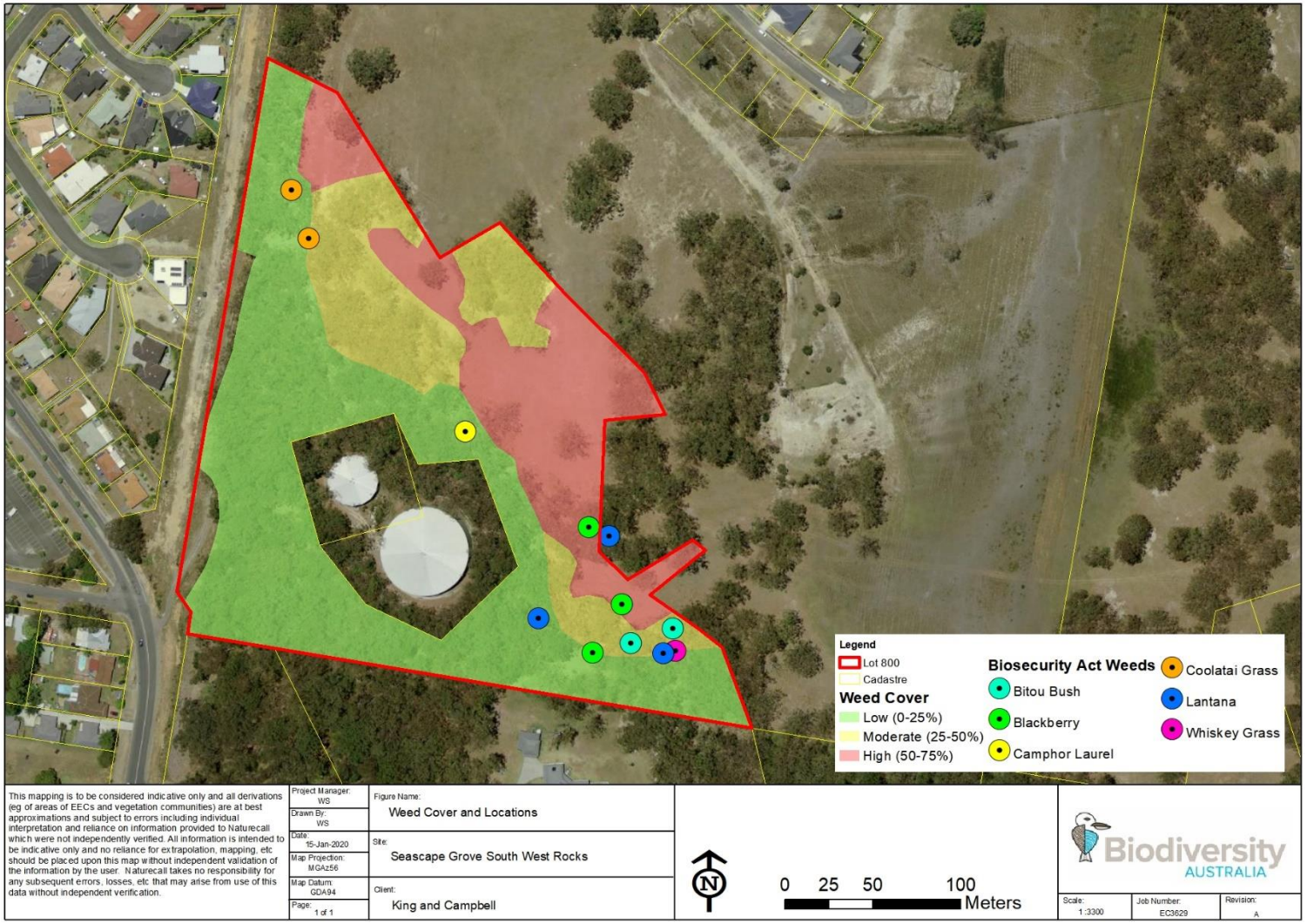
Abundance key: D Dominant at least in some areas,
C Common,
O Occasional,
U Uncommon,
R Rare on site, few specimens.

Common Name	Scientific Name	Abundance
Trees and shrubs		
Camphor Laurel	*Cinnamomum camphora*	R
Bitou Bush	*Chrysanthemoides monilifera*	R
Groundcovers		
Fleabane	*Conyza bonariensis*	O
Cudweed	*Gnaphalium gymnocephalum*	O
Fireweed	*Senecio madagascariensis*	U
Catsear	*Hypochaeris radicata*	C
-	*Richardia stellaris*	O
Paddy's Lucerne	*Sida rhombifolia*	O
Purpletop	*Verbena bonariensis*	O
Balloon Cotton Bush	*Gomphocarpus physocarpus*	O
Cobblers Pegs	*Bidens pilosa*	U
Pennywort	*Hydrocotyle bonariensis*	U

Common Name	Scientific Name	Abundance
Grasses		
Common Paspalum	*Paspalum dilatatum*	D
Broad-leaf Paspalum	*Paspalum mandiocanum*	O
Carpet Grass	*Axonopus fissifolius*	C
Quaking Grass	*Briza minor*	O
Coolatai Grass	*Hyparrhenia hirta*	O
Whiskey Grass	*Andropogon virginicus*	U
Vines and Scramblers		
Lantana	*Lantana camara*	O
Blackberry	*Rubus fruticosus*	C

Photo 4: Blackberry

Figure 6: Weed cover and locations



2.4 Fauna Habitat and Threatened Species

The woodland and forested habitats within Lot 800 would provide habitat for a range of fauna species. There are numerous hollow-bearing trees present which would provide potential breeding and denning habitat for a range of threatened species such as the Squirrel Glider, Brushtailed Phascogale, Microbats, Little Lorikeet and Powerful Owl.

The site is only likely to provide secondary habitat for the Koala and there is unlikely to be a resident Koala population within the site. It may however provide other functions for Koalas such as movement corridors and secondary foraging habitat.

There is limited habitat for small terrestrial species dependant on continuous cover as most of the site and Lot 800 have been underscrubbed and are grazed. Less disturbed areas in the southwest of lot 800 do provide some areas of dense cover and rocky outcrops which may provide habitat for small terrestrial species and reptiles.

There are no creeks, drainage lines or permanent aquatic habitat within Lot 800. A farm dam is located on the edge of lot 800 adjoining the approved subdivision land which may provide a small area of aquatic habitat. It was noted to be dry during a site inspection in December 2019.

Targeted threatened species surveys were undertaken by Darkheart Eco-consultancy in 2007. This survey recorded several threatened fauna species. No threatened flora species or Endangered Ecological Communities were recorded. Threatened flora and fauna species that are known or potentially occurring within the site are listed in Table 3.

Table 3: Known and potentially occurring species

Common Name	*Scientific Name*	BC Act Status	EPBC Act Status	Likelihood of Occurrence
Mammals				
Squirrel Glider	*Petaurus norfolcensis*	V	-	**Known**
Brushtailed Phascogale	*Phascogale tapoatafa*	V	-	Highly likely
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Fair to moderate
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	**Known**
Little-bent-wing Bat	*Miniopterus australis*	V	-	**Known**
Large Bent-wing Bat	*Miniopterus orianae oceanensis*	V	-	Highly likely
Eastern Freetail bat	*Micronomus norfolkensis*	V	-	**Known**
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V	-	Highly likely
Hoary Wattled bat	*Chalinolobus nigrogriseus*	V	-	Highly likely
Birds				
Square-tailed Kite	*Lophoictinia isura*	V	-	**Known**
Glossy Black Cockatoo	*Calyptorhynchus lathami*	V	-	Highly likely
Little Lorikeet	*Glossopsitta pusilla*	V	-	Moderate
Swift Parrot	*Lathamus discolor*	E	E	Fair

Common Name	*Scientific Name*	BC Act Status	EPBC Act Status	Likelihood of Occurrence
Dusky Woodswallow	*Artamus cyanopterus*	V	-	Moderate
White-throated Needletail	*Hirundapus caudacutus*	-	V	Moderate
Powerful Owl	*Ninox strenua*	V	-	Highly likely
Masked Owl	*Tyto novaehollandiae*	V	-	Moderate
Reptiles				
Stephens Banded Snake	*Hoplocephalus stephensii*	V	-	Fair to moderate

3. VMP Objectives and Performance Criteria

3.1 VMP Objectives

The primary objective of the VMP is to ensure that rehabilitation measures and other ecological ameliorative measures are effectively implemented to achieve positive environmental outcomes for the site and broader area, and that conservation measures are maintained in perpetuity.

3.2 Performance Criteria

The overall performance criteria for the VMP comprise the following. Specific performance criteria for each management zone have also been produced.

- Weed cover reduced to levels which do not threaten regeneration success and no new invasive weeds introduced to the site.
- Achieve fully structured forest within currently cleared and disturbed areas
- Increase in fauna habitat structure and complexity
- Human access to conservation area managed through fencing and signage
- Pest animals reduced to a level that do not impact on known and potentially occurring threatened species
- Fire managed appropriately
- Fauna connectivity maintained
- No fauna mortality as a result of vehicle collisions
- Tree removal in APZ limited to the minimum extent necessary and key habitat features retained where possible
- No damage to retained vegetation and habitat features during clearing and earthworks.
- Hygiene procedures effectively implemented and no pathogens introduced to the site.

4. Proposed Environmental Works

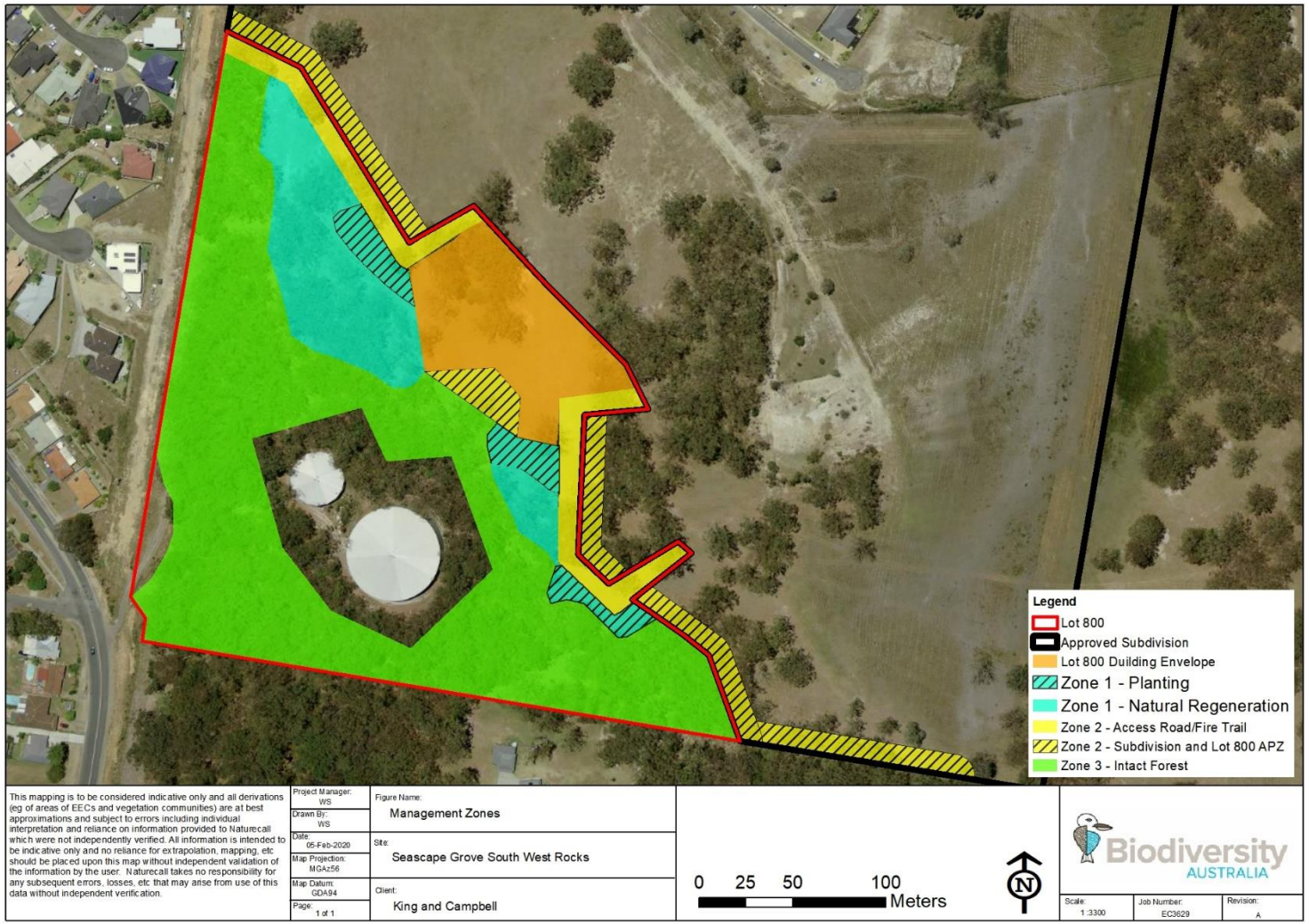
4.1 Identification of Management Zones

To assist in the implementation of the VMP, the site has been stratified into three management zones as follows:

- Zone 1: Regeneration area
- Zone 2: APZ's and fire trail
- Zone 3: Intact forest

This section provides the details and management issues, objectives and scope of environmental works/ameliorative measures proposed for each zone. The location of the management zones is shown in Figure 7.

Figure 7: Location of management zones



4.2 Management Zone 1 – Regeneration Area

4.2.1 Description

This zone is 0.9ha in area and comprises the areas of cleared pasture grassland woodland with no understorey or shrub layers. It contains scattered mature eucalypts and is currently grazed to supress regrowth.

The zone will be subject to tubestock planting, facilitated natural regeneration and weed management. The zone will be subject to formal maintenance (weeding, watering, replacement planting) for 3 years.

4.2.2 Management Issues

This zone has been partially cleared and has been grazed by horses for many years. The soil is likely to be heavily compacted which may impact regeneration success.

It has a moderate to high weed cover of pasture weeds and exotic grasses in the ground layer. Weeds will need to be controlled and monitored regularly to determine if follow-up control is required.

4.2.3 Zone Objectives

1. Tubestock planting and facilitated natural regeneration to create a fully structured forest
2. Create ground layer vegetation and provide habitat features (bushrock and hollow logs) for terrestrial fauna
3. Reduce weed cover to less than 5% of the projected cover of each stratum after 2 years
4. Removal of all Biosecurity Act listed weeds after 3 years

4.2.4 Required Works

4.2.4.1 Natural Regeneration

Natural regeneration with desirable species is occurring throughout some areas of the regeneration area, especially in areas directly adjacent to intact forest or with existing canopy trees. It was noted that a number of Scribbly Gum saplings are regenerating along with occasional shrub species (Photo 5). These areas are recommended to be allowed to regenerate naturally, with weed control used to remove and control invasive weeds that also are likely to regenerate once grazing has ceased.

Photo 5: Natural regeneration occurring on edge of forested area

4.2.4.2 Tubestock Planting

Tubestock planting is proposed to commence in Year 1 of the VMP and will involve the planting of canopy trees and understorey trees/shrubs to eventually create a fully structured forest in the 3000m^2 regeneration planting area. Planting of groundcover species is unlikely to be required as native grasses, sedges and herbs are likely to regenerate naturally.

Canopy trees are to be planted at a density of one tree per 100m^2 (10x10m spacing) to ensure a mature canopy is achieved. Mid storey trees and shrubs can be planted at a higher density to fill in gaps between the canopy trees. Recommended planting densities are 1 plant/50m^2 (7x7 spacing) for mid storey and shrubs.

Within the 3000m^2 planting area, this spacing will require the following number of plants:

- 30 canopy trees
- 60 understorey trees and shrubs

Tubestock is to be sourced locally (e.g. Port Macquarie Landcare Nursery, Bluedale Wholesale Nursery) and be comprised of the species listed in Table 4. Planting specifications are provided in the following section.

Table 4: Recommended species for planting

Common Name	Scientific Name	Suggested Ratio
Canopy Trees		
Scribbly Gum	*Eucalyptus signata*	50%
Red Bloodwood	*Corymbia gummifera*	20%
Needlebark Stringybark	*Eucalyptus planchoniana*	10%
Tallowwood	*Eucalyptus microcorys*	20%
Understorey Trees and Shrubs		
Cherry Ballart	*Exocarpus cupressiformis*	10%
Forest Oak	*Allocasuarina torulosa*	25%
Hickory Wattle	*Acacia binervata*	10%
Hard Quandong	*Elaeocarpus obovatus*	10%
Willow Bottlebrush	*Callistemon salignus*	20%
Coastal Banksia	*Banksia integrifolia*	25%

4.2.4.2.1 Planting Specifications

The following provides details on recommended tubestock planting methods:

- 90 replacement trees (comprising species listed in table 4) will be planted at 10m spacing for canopy trees and 7m spacing for understorey trees and shrubs.
- Plantings are to be protected with tree guards.
- Remove any and all weed species including exotic grasses using environmentally acceptable methods (i.e. hand pulling and selective herbicide spraying) from nominated planting areas
- Fertiliser and water crystals are to be used for each plant
- Each tree is to be provided with a mulch bed of native materials with a minimum 1m radius and 100m depth. This mulch material is recommended to be sourced from chipping of trees removed for the proposal (as per condition D23 of the issued consent).
- Water at planting and regularly (at least once per month or if insufficient rain every 2 weeks) for first 3 months
- The plantings are required to have a 100% survival rate, with replacements of any failures made within 3 months using the same size or larger tree.
- Slashing is to cease in the revegetation area once trees are planted

4.2.4.3 Salvage and Placement of Bush Rock and Habitat Logs

During clearing operations within the subdivision footprint, it is recommended that hollow limbs and logs are salvaged and placed within management Zone 1 as ground habitat for fauna.

If any bush rock requires removal for the subdivision or fire trail, this is also recommend to be salvaged and relocated to Zone 1.

Salvage and relocation of habitat logs and hollow limbs is to be undertaken by an arborist under the supervision of a qualified ecologist. Placement of bush rock in Zone 1 is to be supervised by an ecologist.

4.2.4.4 Weed Control

Weed cover within Management Zone 1 is currently moderate to high. Weed control will be required to treat infestations of exotic weeds to achieve the weed cover objectives and reduce competition with tubestock plantings. An initial control event plus regular follow-up control sessions over 5 years will be required to adequately treat weeds. Recommended timing for weed control is provided in the implementation plan.

High volume spraying should be limited to weed densities of 75% cover or more, with preference given to manual removal and regeneration techniques. A splatter gun may also be used to treat high density Lantana.

4.2.4.4.1 Treatment Methods

The following table describes recognised weed treatment methods that may be used on the site.

Table 5: Weed control techniques

Weed Treatment Techniques	
Physical Removal	The plant is grasped firmly at the base close to the soil surface and gently but firmly pulled from the soil ensuring that tap roots or tubers are removed to reduce the potential for regrowth. Herbaceous weeds and grasses are most effectively treated using this method. Once the weed is removed it is left exposed on the soil where it dies. No vegetative reproducing species are treated in this manner. If one of these species is removed it is placed in a heavy duty plastic bag and disposed of through appropriate council waste disposal. This method is employed when working in close proximity with native species when chemical treatments are unacceptable due to the risk of spray drift. The hand removal method allows for the selective clearing of weeds within rehabilitation plantings and natural rehabilitation areas. This treatment is often employed during rain when chemical treatments are ineffective.
Foliar spraying	A knapsack spray unit or vehicle mounted unit is used to apply a water diluted glyphosate and dye mixture (1L:100L) over all the foliage of a plant. It is essential that as much of the foliage is covered as possible to ensure an effective treatment. This method kills the invasive species but leaves the majority of the plant standing. This is effective when treating stands of Lantana (Lantana camara) or other woody weeds. The standing remains of these weeds provide shelter for establishing native species by reducing the effects of adverse weather conditions and preventing physical damage by reducing access to the area.
Cut scrape and paint (CSP)	Cut and scrape the bark of vines and saplings along one side only for up to 100 cm if possible before continuing on the other side moving up the stem leaving a 5 cm gap between each scrape. Within 7 seconds of scraping the stem a spray or applicator bottle is used to administer a concentrated herbicide solution (1:1) to the sap wood. Various vine and creeper species can be treated using this method with the vines being left to die in the tree canopy before being pulled down and removed if required.
Cut stump	This method involves the felling of the entire plant with the remaining root stock and stump treated with herbicide. The plant is felled at ground level to avoid potential trip or puncture wound hazards to individuals moving within the site. A concentrated herbicide solution is applied immediately to the exposed surface at a ratio of generally

Weed Treatment Techniques	
	1:1 with water. The remainder of the plant should die in place if treatment has been effective. Stumps can be left in place to reduce erosion and maintain soil structure and stability; or be removed once the plant is dead.
Quick spray	The quick spray unit is an effective spray method used for large areas requiring extensive foliar spray application. The unit consists of a 600L tank of mixed solution at rate of 1:100 (glyphosate to water) that is applied manually from a high distribution spray gun connected to a petrol driven water pump producing a high pressure spray extending 10m+ with adjustable delivery. The increased herbicide coverage area provided by this method makes it preferable for the treatment of grasses and broadleaf weed species.
Skirting	Vine stems are cut using loppers or secateurs approximately 30cm from the ground. These stems are treated using the CSP method. The remainder of the vine is left in place and will die in the tree or shrub canopy. Some species of vine support aerial tubers which may need to be collected at the time of treatment to prevent further spread.
Splatter gun	A splatter gun is a modified spray unit which produces a solid stream of large droplets of concentrated herbicide mixture. This unit can be sprayed 6-10 metres from the area which requires treatment. Due to the concentrated nature of the herbicide (1:9) only a small fraction of the total foliage of each plant requires treatment to provide an effective result. This method is employed in dense woody weed thickets and other areas of limited access.
Spot spraying	Spot spraying is conducted using a low pressure spray 15 Litre knapsack. Each knapsack is only filled to 10 Litres to comply with WHS weight recommendations. A water diluted glyphosate and dye mixture (1:100) in short bursts is applied to small herbaceous plants and juvenile woody weeds. Regrowth areas where isolated plants have established are best treated using this method.

The following table below contains the recommended weed control techniques specific to the Biosecurity Act listed weed species recorded on site.

Table 6: Recommended weed control techniques for Biosecurity Act listed weeds on site

(Source: NSW Dept. of Primary Industries: Noxious and environmental weed control handbook)

Weed Species	Chemical and Concentration	Technique
Lantana (*Lantana camara*)	Glyphosate360g 100 ml/10 L water foliar spray Glyphosate 360g 9:1 Splatter Gun	• Overall foliar spray with chemical or; • Basal bark or Cut stump (Glyphosate undiluted) • Thoroughly wet all foliage and stems. Avoid summer stress • Slashing or manual removal can be effective • Splatter Gun application
Blackberry (*Rubus fruticosus aggregate*)	300g/L Triclopyr, 100g/L Picloram, 8g/L Aminopyralid at 350ml or 500ml/ 100l of water depending on infestation characteristics.	• Foliar spray • Slashing of juvenile bushes

Bitou Bush (*Chrysanthemoides monilifera subsp. rotundata*)	Glyphosate 5 or 10 ml/ 1 L water	• Handgun or knapsack. Spray to wet all foliage. • Apply at peak flowering to actively growing bushes during winter. Do not apply during periods of drought stress • Use the higher rate for plants over 1.5m • Hand removal of young plants
Coolatai Grass	Glyphosate 360g/L Rate: 200 mL glyphosate plus 20 mL flupropanate per 10 L of water	• Spot spray application between July and October
Fireweed (*Senecio madagascariensis*)	Metsulfuron-methyl 600 g/kg (Brush-off®) 10 g in 100 L of water Spot spray application	• Spot spray application. • Hand weeding - Pull out individual plants in small, isolated patches or sensitive environmental areas.

4.2.4.4.2 Target Areas

The locations of weed infestations over the site are shown in Figure 6. These areas are to be targeted by a bush regeneration contractor using the weed control methods outlined in Table 5 and 6. Individual plants or small infestations are recommended to be hand-pulled where possible to minimise the use of herbicides.

Any weed infestations that arise throughout the life of the VMP are to be treated using appropriate control methods.

4.2.4.4.3 Weed Disposal

Weeds removed from the site are to be bagged and taken to a licenced landfill facility.

All weed material encountered during clearing/thinning within the clearing footprint and APZ is to be separated from native vegetation and taken to a licensed landfill facility for disposal. Weeds are not to be mulched with native vegetation or re-spread over the site. Burying of weeds on site will not be permitted.

Any topsoil that is infested with weeds and/or weed seed is to be disposed of at a landfill and not stockpiled or used on site.

4.2.4.5 Removal of Rubbish and Construction Waste

There are several piles of rubbish and construction waste within the north-western corner of Lot 800 (Photo 6). These should be removed and taken to landfill.

Photo 6: Waste piles in Lot 800

4.3 Management Zone 2 – APZ and Fire Trail

4.3.1 Description

This zone is 1.1ha in area and comprises the 12m wide APZ for precinct C and D of the subdivision, as well as the adjoining Fire trail/access road and APZ for Lot 800. Engineering plans for the fire trail have been prepared by King and Campbell. This zone contains scattered mature eucalypts with no understorey or shrub layer and is currently grazed to supress regrowth.

The zone will be subject to APZ maintenance to maintain low fuel load. As it forms the interface between the subdivision and the Lot 800 conservation area, it will need to be fenced and posted with signage.

4.3.2 Management Issues

This zone occurs on the boundary of the subdivision footprint and the conservation zone and there is potential for adjoining residents to dump garden clippings or extend their backyards into this zone.

It also forms the Asset Protection Zone for the subdivision and will need to be continually managed to supress regrowth and keep fuel loads low.

4.3.3 Zone Objectives

1. Significant trees selectively retained and protected in APZ
2. Fuel loads maintained at low levels to reduce fire risk

3. Human access controlled via fencing and signage
4. No significant weed infestations and weed cover in the groundcover reduced to <5%

4.3.4 Required Works

4.3.4.1 Retention of Habitat Features in APZ

Vegetation removal required for the Asset Protection Zone must be to the minimum extent necessary and must avoid removing any hollow-bearing trees. Tree canopy cover within the inner protection area should be thinned to approximately 15% cover and 30% cover in the outer protection area.

Canopy separation/thinning requirements are to be achieved via pruning limbs where possible (to avoid entire tree removal), and removing understorey vegetation and non-hollow-bearing trees.

Trees to be retained are to be clearly marked with distinctive temporary taping by an ecologist. An ecologist must be present when clearing/thinning is taking place to ensure tree retention procedures are adhered to.

4.3.4.2 APZ Management, Slashing and Fuel Reduction

Regular slashing and maintenance of the APZ and fire trail will be required to prevent regrowth and dense groundcover. Grass should be kept mown to a height of less than 100mm (PBP 2019). Stick raking and collection of debris may also be required as Eucalypts in adjoining areas will continually drop leaves and branches.

The management of the site's APZ will also be guided by Planning for Bushfire Protection 2019.

4.3.4.3 Restriction of Access - Fencing and Signage

Access to the conservation area within Lot 800 is to be restricted to bush regenerators, Rural Fire Service and Ecologists carrying out monitoring.

Residents in adjoining residential land and the public are to be excluded from the conservation area via fencing and signage. Horses are likely to remain on the subject land for a number of years until it is fully developed and these are to be excluded from Lot 800.

Fencing is recommended to comprise simple post and rail or post and plain wire. The fencing must be designed to allow free fauna access and not pose a risk of entanglement. Dense plantings of groundcover sedges such as Lomandra and Carex may also be used to deter human access.

Fencing between Lot 800 and future residential areas will only need to be temporary (e.g. star picket and wire) until new Lots are established and permanent boundary fencing such as lapped and capped timber fencing or Colorbond will be constructed.

Locked gates will be required at designated entry/exit points to allow for personnel and RFS to access Lot 800.

Signs are to be erected at four points along the fence line. Suggested content for the signs is as follows:

<u>Conservation Area</u>
No access permitted
No dumping of garden waste
Please report any breaches to Kempsey Shire Council

The recommended location of fencing and signs is shown in Figure 8.

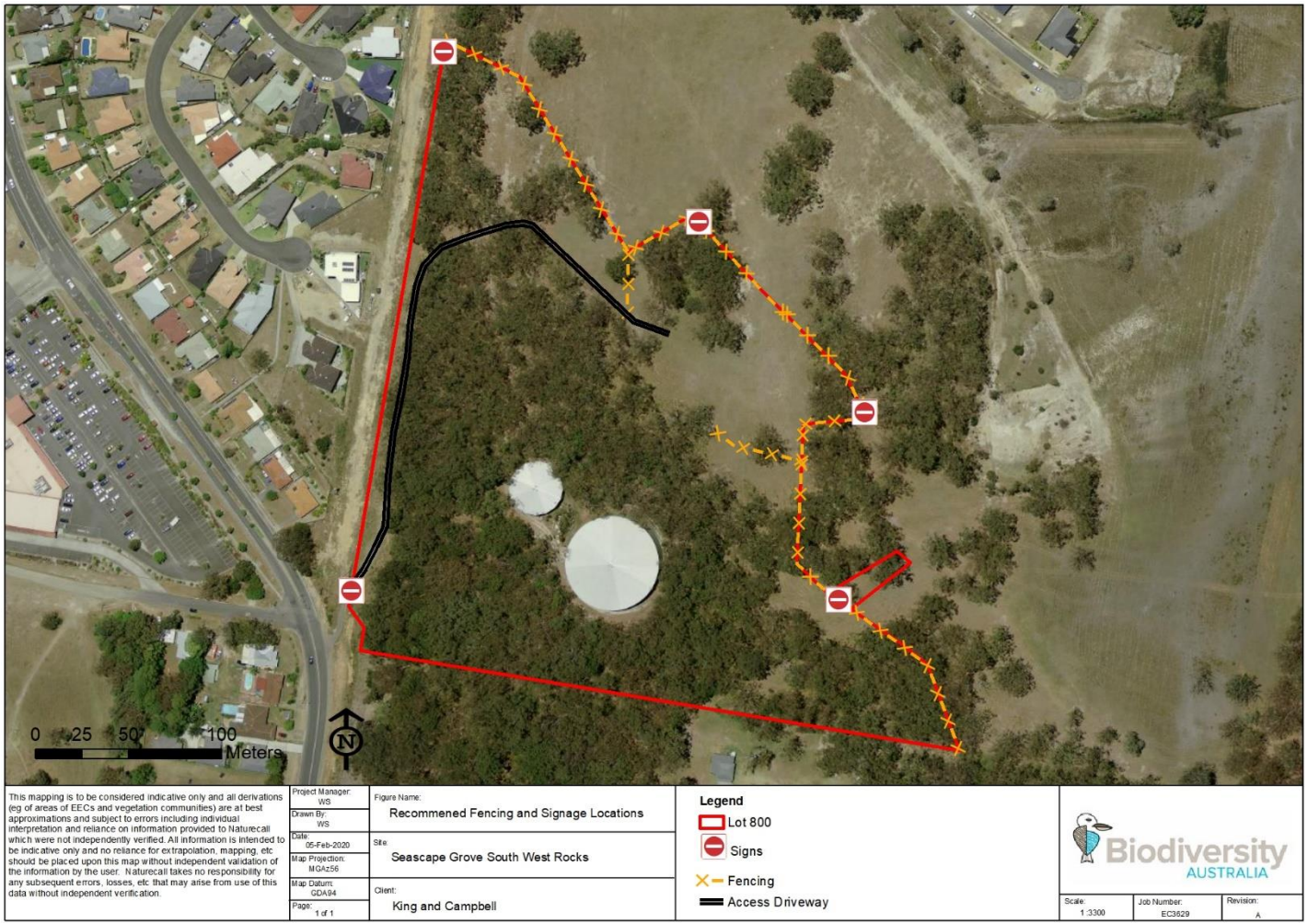
4.3.4.4 Weed Control

Weed control will be required to remove any existing weed infestations within this zone. Effective control and follow-up maintenance within this area will reduce the potential for weed spread into the adjoining conservation areas.

Weed cover is currently at a low to moderate level and primarily consists of exotic grasses and pasture weeds. It is likely to take some time for these species to be removed and replaced with native groundcover species.

The most effective weed control methods are likely to comprise manual removal for scattered herbs and shrubs (eg Fireweed, Lantana) and spot spraying with suitable herbicide for pasture weeds and grasses.

Figure 8: Fencing and signage



4.4 Management Zone 3 – Intact Forest

4.4.1 Description

This zone comprises the areas of existing dry sclerophyll forest which occur in a natural state. This covers 3.3ha and comprises more than half of the conservation area on Lot 800. Two water reservoirs and an access road are located within this zone which do not form part of Lot 800 or the VMP. The vegetation has some scattered weeds throughout including Lantana and Camphor Laurel.

This zone will require less management than the other management zones and will only require a minor level of weed control. Fauna nesting boxes are recommended to be installed on trees within this zone. Fencing and restriction of access will also be required.

4.4.2 Management Issues

This zone has a 1627m perimeter and adjoins a variety of land uses. There is high potential for unauthorised access and creation of trails, dumping of rubbish etc. Access to the zone will need to be controlled via signage and fencing.

This zone has some existing weed issues. There are several patches of Lantana present as well as occasional Camphor Laurel saplings.

Given the large perimeter, this zone also has potential to be impacted by edge effects such as light, wind and weeds. Ongoing monitoring will identify the need for any edge treatments such as additional plantings or screening.

4.4.3 Zone Objectives

1. Dry sclerophyll forest community maintained in a natural state
2. Reduce weed cover to less than 5% of the projected cover of each stratum after two years
3. Removal of all Biosecurity Act listed weeds after 3 years
4. Human access controlled via fencing/gates and signage

4.4.4 Required Works

4.4.4.1 Fauna Nesting Boxes

The instillation of fauna nesting boxes to offset the loss of tree hollows are a requirement of the subdivision approval. The required nest boxes are recommended to be installed on mature trees within this zone.

The ecological report and development plans associated with the approved Major Projects have identified six trees containing hollows as being approved for removal. According to table 11 of the Darkheart 2007 report, these trees contain approximately 16 hollows, however the exact number is unclear as many of the hollow entrances are not visible from the ground.

The following guidelines are provided to meet nest box requirements:

- One nest box should be provided per hollow lost as part of the development. The number of hollows within the six identified hollow-bearing trees is to be quantified by an ecologist during clearing operations once the trees have been felled.
- A variety of nest box types are recommended to target a range of fauna, especially threatened species. The size and type of hollows lost as part of the development should also be a

consideration in nest box type. Next boxes are recommended to include those specifically designed for the Squirrel Glider, Brushtailed Phascogale, Microbats, Little Lorikeet and Powerful Owl.

- Nest boxes are to be installed prior to removal of hollow-bearing trees
- Nest boxes are to be installed by a qualified ecologist or an arborist under the supervision of and ecologist
- Nest boxes are to use plastic coated wire to reduce impact on host trees
- Boxes should be constructed of ACQ treated timber and finished with a non-toxic stain/varnish for longevity
- Boxes should be installed on mature trees which do not contain hollows at a height of 10m for owls and 4-6m for other species.
- Boxes are to be inspected annually to document fauna occupation and if there are any maintenance issues
- If European bees or other feral species (e.g. Indian Mynah) are recorded using nest boxes, they are to be removed

4.4.4.2 Fencing and Access

Fencing around the western and southern perimeter of Lot 800 will need to be constructed where required and maintained. Access should be restricted to personnel accessing the water storage reservoir and ecologists/bush regenerators undertaking environmental works.

4.4.4.3 Weed Control

Weed control will be required to remove any existing weed infestations within this zone. Effective control and follow-up maintenance within this area will reduce the potential for weed spread.

Weed cover is currently at a low level and primarily consists of patches of Lantana. Hand pulling is likely to be the most effective control method for this zone. Cut and paint methods may be needed for Camphor Laurel saplings if they are too large to be removed by hand.

4.5 Other VMP Requirements

4.5.1 Qualifications of Bush Regeneration Contractors

All bush regeneration works involving tree planting, weed control and monitoring is to be supervised by an appropriately qualified and experienced person with, as a minimum, qualifications of TAFE Certificate III in Bush Regeneration or Conservation and Land Management – Natural Area Restoration and 4 years bush regeneration experience.

Monitoring works described in Section 6 are to be undertaken by a qualified ecologist with a degree in Environmental Science/Natural Resource management or similar and at least 5 years' experience in the industry. This also applies to installation of nest boxes and supervision of bush rock and habitat log placement.

4.5.2 Ecological Fire Regime

The VMP area contains a dry sclerophyll forest which is bushfire prone. The Scribbly Gums and Blackbutt in this community regularly shed bark and limbs which leads to high fuel load accumulations of up to 10t/ha within 2-5 years of a low intensity fire (Kenny et al. 2004).

The previous fire history of the site is not known, however there is no evidence of a recent fire on the site. The ecological report for the development stated that the property appeared to not have been burnt for at least 10 years at the time of the surveys in 2007 (Darkheart 2007). It is likely that the site has not been burnt since these surveys were carried out.

The Guidelines for Ecologically Sustainable Fire Management (Kenny et al. 2004) provide fire interval guidelines for various broad vegetation types. For Dry Sclerophyll Forest (shrubby) vegetation, the recommended interval is 7-30 years, with the higher end of this range more desirable.

The vegetation within zones 1 and 3 should be managed to exclude bushfire. It is recommended that low intensity hazard reduction burns are undertaken in consultation with NSW Rural Fire Service as required depending on bushfire risk and fuel loads. This will reduce leaf litter accumulations and the risk of hot destructive fires.

4.5.3 Fauna Crossings

Burrawong Drive is the main road through the subdivision and runs off Belle O'Connor Street in the north-west of the subdivision. It is currently only partially developed, but will eventually extend southwards and run between the subdivision area and Lot 800.

A large number of mature trees will be retained within precinct D of the subdivision footprint. Once Burrawong Drive is developed it will bisect these trees from retained habitat within Lot 800 and the new road will pose a risk of road strike to fauna, especially Koalas, possums and small terrestrial mammals. Figure 9 below shows the areas of retained trees and likely location of fauna movements.

Figure 9: Fauna crossing points

Red circles shown areas of retained trees and arrows depict likely fauna crossing points

To mitigate the risk of vehicle strike on fauna, several measures are proposed. The most effective method would consist of a fauna underpass in the form of a large concrete box culvert, ideally with dimensions of 3x3 metres (VicRoads 2012). This may also be used as part of a stormwater drainage system, however should not retain water after heavy rain. The underpass can be fitted with logs and railings to encourage use by fauna.

Regardless of whether a fauna underpass is constructed, traffic calming devices and fauna crossing signage is to be installed on Burrawong Drive. Traffic calming methods may include speed bumps, rumble strips and road narrowing. Signage should include roadside signs indicating a wildlife crossing point and reduced speed limit.

Signage and traffic calming devices are recommended to be installed on Burrawong Drive between Lots 516 and 518.

4.5.4 Feral Animal Control

No feral animals have been previously recorded within the site during the subsequent ecological assessments. There is potential for feral predators such as the Fox and Feral Cat to occur. These species pose a significant risk to native fauna via predation and competition.

Domestic cats and dogs can also pose a risk of predation to native fauna, especially if they are not contained in dwellings and yards and are allowed to roam in bushland areas. Condition E2(f) requires a restriction as to user for Lot 800, prohibiting the ownership of cats or dogs, with the exception of assistance animals as defined by the *Companion Animals Act 1998.* In addition, Condition E2(a) requires the creation of a restriction as to user to be created over all lots within the development requiring cats to be confined indoors between sunset and sunrise. If enforced, these requirements would significantly reduce the risk of fauna predation from domestic animals.

The need for feral animal control is recommend to be determined through a baseline monitoring program. This would use a range of techniques such as Passive Infra-Red (PIR) trail cameras, scat and track surveys and spotlighting to record the presence and abundance of any feral species present.

If the feral animal monitoring surveys determine there is a population of feral species present, this would trigger the requirement for feral animal control. Depending on the target species, control methods may include shooting, baiting and trapping by a qualified and licenced vertebrate pest controller.

4.5.5 Hygiene Protocols

4.5.5.1 Exclusion Zones

During clearing and construction works, exclusion zones are to be established around areas of retained vegetation within Lot 800. This is to be achieved via temporary fencing and signage.

Vehicles and machinery are to be restricted to designated tracks, trails and parking areas to minimise the spread of weeds over the site.

4.5.5.2 Imported Fill

Any imported materials including topsoil, fill or mulch products are to be certified as weed free.

4.5.5.3 Vehicle and Machinery Washdown

Under the NSW Biosecurity Act 2015, all persons have an obligation to take reasonable and practical measures to prevent or minimise the biosecurity risks associated with their activities or dealings with the carriers of invasive plants. All types of vehicles and machinery are capable of being carriers of

invasive plants and plant diseases. All machinery and vehicles entering the site are to be free of mud, soil and organic matter before entering.

To reduce the potential for spread of weeds, and pathogens including Myrtle Rush and Phytopthora, a washdown station with high pressure cleaners is to be established at the entrance to the site. This is to be used by all vehicles and machinery that are required to work in or near areas of native vegetation on the site. Machinery/vehicles leaving the site must also be washed down. The washdown station is to be clearly posted and include instructional signage. Wash down water must not be allowed to drain into the site.

The washdown station must include a spray bottle for disinfecting footwear of all persons entering the construction site. This should contain a solution of 70% ethanol or methylated spirits in 30% water.

Clearing and construction contractors are to be inducted on Phytopthora and Myrtle Rust identification and management.

Should any plant diseases or pathogens be identified on the site during works, an exclusion zone must be established around the contaminated area to prevent further spread. Hygiene protocols are to be reviewed and additional measures are to be implemented if required.

5. Implementation Plan

The following table provides the implementation plan for the VMP. Its details the required actions along with responsibilities and timing.

Table 7: Implementation plan

Mgt Zone	Requirement	Actions	Timing	Responsibility
1	Natural Regeneration	Delineate natural regeneration area from planting area	Year 1	Surveyor
		Exclude grazing and slashing	Upon commencement of VMP	Landowner/project manager
	Tubestock planting	Offset planting area surveyed and pegged.	Year 1	Surveyor
		Out-planting of tubestock: • Holes dug with tree planter or tractor mounted auger • Fertiliser and water crystals used for each plant • Tree guards placed around each plant • All plants watered immediately after planting	Year 1	Bush regeneration/horticultural contractor
		Plants watered every month in dry weather until established.	Year 1	Bush regeneration/horticultural contractor
		Any tubestock losses replaced.	Year 2-5	Bush regeneration contractor
	Hollow and bushrock salvage	Salvage of hollow logs/limbs and bushrock	During clearing	Clearing contractor/ecologist
		Placement of salvaged rocks/logs in conservation area	During clearing	Clearing or civil contractor under supervision of ecologist
	Weed Control	Initial weed control	Year 1 prior to tubestock planting	Bush regeneration contractor
		Follow-up weed control	6 monthly intervals for 5 years	Bush regeneration contractor

	Waste Removal	Removal of rubbish and construction waste	Year 1	Civil contractor
2	Selective retention of habitat features in APZ	Habitat feature mark-up	Prior to clearing	Ecologist
		Contractor briefing and clearing supervision, protection of retained trees during clearing	Prior to clearing	Ecologist/clearing contractor
	APZ maintenance	Slashing and collection of sticks and debris	Ongoing at 3 monthly intervals	Contractor
	Fencing and signage	Survey and pegging of fence lines	Year 1	Surveyor
		Construction of fence	Year 1	Fencing contractor
		Instillation of signage at specified locations	Year 1	Fencing contractor
		Maintenance of fencing	Year 2- ongoing	Fencing contractor
	Weed Control	Initial weed control	Year 1	Bush regeneration contractor
		Follow-up weed control	6 monthly intervals for 5 years	Bush regeneration contractor
3	Fauna nesting boxes	Source required number and type of nest boxes	Prior to removal of hollow-bearing trees	Ecologist
		Install nest boxes on site	Prior to removal of hollow-bearing trees	Ecologist
		Monitoring of nest boxes	Annually for 5 years in conjunction with annual monitoring	Ecologist
	Fencing and access	Survey and pegging of fence lines	Year 1	Surveyor
		Construction of fence	Year 1	Fencing contractor
	Weed Control	Initial weed control	Year 1	Bush regeneration contractor
		Follow-up weed control	6 monthly intervals for 5 years	Bush regeneration contractor
All	Fire management	Hazard reduction burns	As required to manage fuel loads	Rural Fire service

Approved subdivision	Fauna crossings	Incorporation of fauna crossings into road design	Detailed subdivision design phase	Engineer
		Construction of fauna crossings	Construction phase – precinct D	Civil contractor
All	Feral animals	Control of feral animals if determined to be required by monitoring	As required	Licenced vertebrate pest controller
All	Hygiene protocols	Establish exclusion zones and access points Brief construction personnel Establish washdown points	During clearing and construction phase	Ecologist/clearing and civil contractors
All	Baseline pest survey	Carry out survey for pest animals	In conjunction with first monitoring event	Ecologist
All	Monitoring and reporting	Vegetation monitoring survey Photo point monitoring VMP compliance inspections	Annually until all works completed and objectives achieved	Ecologist
		Monitoring report	Annually until all works completed and objectives achieved	Ecologist
All	Protection of conservation area	VMP registered on title of Lot 800	Prior to issue of subdivision certificates	Planner/Conveyancer
		Restriction as to user for Lot 800 prohibiting ownership of cats or dogs	Prior to issue of subdivision certificates	Planner/Conveyancer
		Positive covenant on Lot 800 requiring that the land within Lot 800 is to be managed in perpetuity for conservation and in accordance with the VMP	Prior to issue of subdivision certificates	Planner/Conveyancer

6. Monitoring, Costing Reporting and Compliance

6.1 Monitoring Requirements

Monitoring will be required to be undertaken annually for at least 5 years and may need to continue depending on the success of regeneration. Monitoring will no longer be required when all works have been completed and Council deems that the VMP provisions have been successfully implemented.

6.1.1 Pest Monitoring

A baseline pest monitoring survey is recommended to be undertaken in conjunction with the first monitoring event. This would use a range of techniques such as Passive Infra-Red (PIR) trail cameras, scat and track surveys and spotlighting to record the presence and abundance of any feral species present.

If the feral animal monitoring surveys determine there is a population of feral species present, this would trigger the requirement for feral animal control.

6.1.2 Regeneration and Weed Monitoring

To monitor the success of regeneration within the conservation zone, a number of permanent vegetation monitoring points are recommended to be established. This will both monitor the success of regeneration over time and highlight any issues. Vegetation data collected in the field is to be compared to published benchmarks for each community monitored. Points are to be marked with a star picked and recorded via GPS.

Recommended locations for permanent monitoring points are shown in Figure 10. Actual locations are to be established during the first monitoring event. These points should be monitored annually by a qualified ecologist.

6.1.3 Photo Point Monitoring

Photo points are recommended to be established throughout the conservation lands to monitor the progress of regeneration. Photo points should be established at each permanent vegetation monitoring point as well as supplementary locations throughout the subject land. Recommended locations are shown in Figure 10.

The photos are to be taken at a consistent height and direction so as to allow comparison to previous years.

6.1.4 Nest Box Monitoring

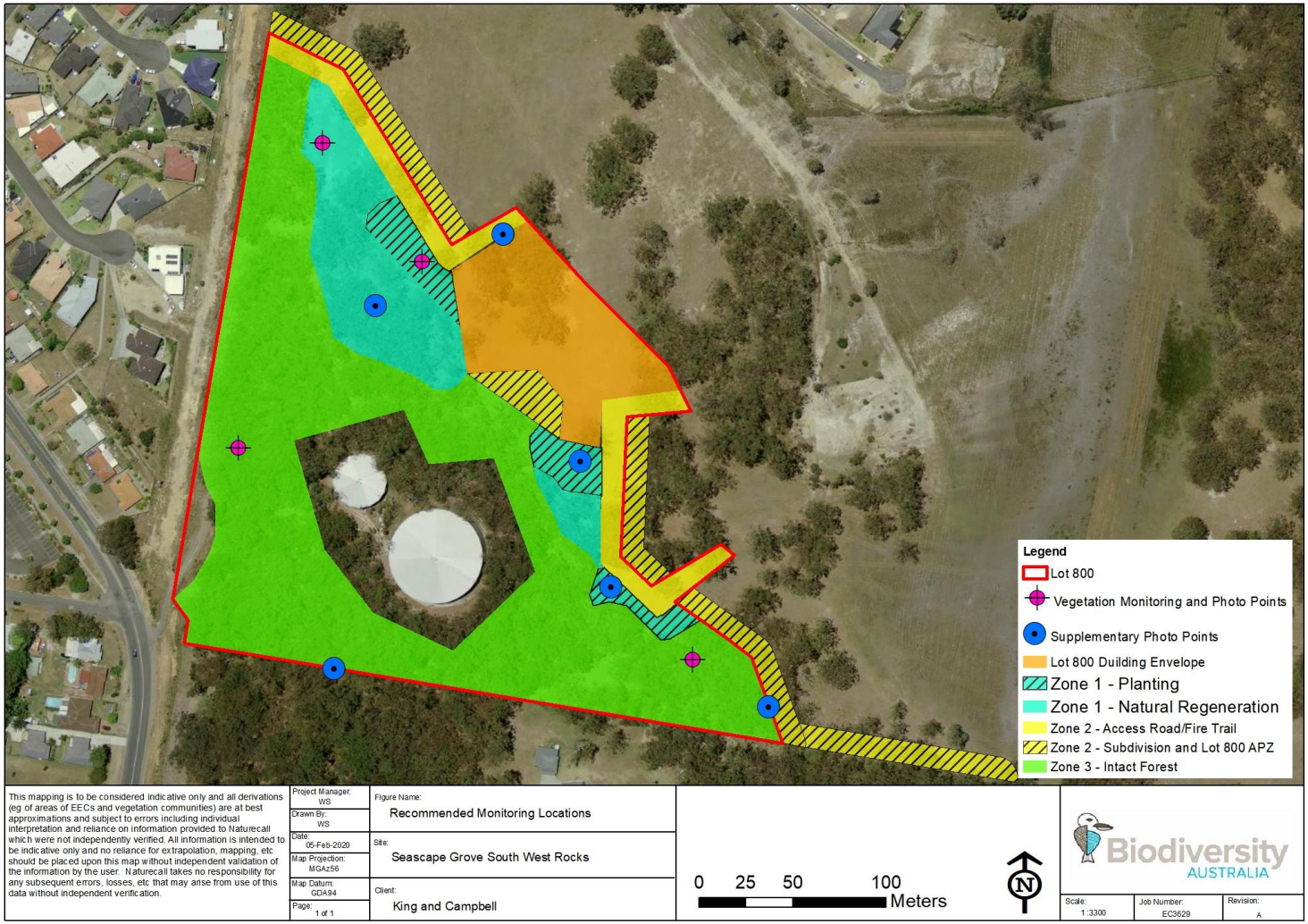
All nest boxes installed within Lot 800 are to be monitored annually by an ecologist. Monitoring will consist of inspecting each box, ideally with an inspection camera, to determine if they are being utilised by fauna. Any maintenance issues with the nest boxes and follow-up actions required shall be noted.

6.1.5 VMP Compliance and Management Issues

General site inspections are to be undertaken to note any issues in the VMP area including:

- Dumping of rubbish or garden clippings
- Unauthorised access
- Evidence of feral species and need for feral animal control
- Compliance with actions and environmental works specified in the VMP

Figure 10: Recommended location of regeneration monitoring and photo points



6.2 Reporting Requirements

Monitoring reports will be required annually for at least 5 years and may need to continue depending on the success of regeneration. These will essentially address/detail the following matters where relevant as follows:

- Details on success of tubestock planting and natural regeneration, including vegetation assessment results and photo points
- Status of weeds and recommendations for further control where required
- Details on nest box inspections
- Details on any feral predator sightings, weed infestations, and any controls
- Details of any management or maintenance issues that need to be addressed
- Details on APZ maintenance
- Details on compliance/implementation of other measures detailed in this VMP to date eg fencing, tree protection and retention and recommendations for compliance enforcement.
- Recommendations for improvements that will have to be implemented (with appropriate time lines to allow compliance). Implementation of these measures is to be detailed in the subsequent reports.

Appendix 1 contains a proforma monitoring sheet which has been adapted from the Biodiversity Assessment Method (BAM) field plot. These or similar are to be used at yearly monitoring intervals to undertake an assessment of the implementation of the planting and habitat management measures specified in this VMP.

6.3 Protection of the Offset Area

The conservation area within Lot 800 will be afforded permanent protection via a title restriction as per the provisions of Condition E2 of the issued consent.

Condition E2(g) requires a positive covenant requiring that the land on 800 (with the exception of land marked as existing cleared area, between the two access trails for regeneration maintenance) is to be managed in perpetuity by the owner of the lot for conservation and in accordance with the approved VMP. Management of Lot 800 must include maintenance of fencing and signage in perpetuity.

6.4 Compliance

The implementation plan listed in this document sets out the specific actions required to be undertaken by responsible authorities to implement the recommendations of the VMP; responsible authorities; and thresholds for completions to monitor implementation of the VMP.

Annual monitoring over a minimum of 5 years will also ensure plantings are effectively established and require little maintenance after this period. Compliance check will be undertaken with each monitoring event and results, including the need for follow-up action or contingency measures, will be detailed in the annual reports.

The VMP will be deemed successful if monitoring determines that the objectives stated in section 3.0 are achieved as per the listed specified performance criteria.

6.5 Provisional VMP Costing

An estimate of the costing for carrying out the regeneration works is detailed in the following table:

Table 8: Provisional costing for planting and weed control

Item/ Activity	Time/ Labour	Materials	Cost $
Planting costs		90 plants @ $2.50 ea	$225.00
Tree guards		90 small plastic guards	$60.00
Stakes		270 stakes	$70.00
Planting	12 hrs @ $180/hr (2 people)		$2160.00
Fertiliser/ water crystals		Fertiliser + crystals for 90 plants	$50.00
Initial weed removal and spraying	8hrs @ $180 p/h (2 people)	Herbicide	$1140.00
Maintenance/watering as required	4 hrs every month for 1 year = 48 hrs @ $90 p/h		$4320.00
Weed control	4hrs every 6 months for 5 years = 40hrs @ $90 p/h	Herbicide	$3600.00
		Total Cost (ex GST)	**$11,625.00**

7. Conclusion

This Vegetation Management Plan has been prepared to guide future management action, restoration activities and monitoring across the conservation area within Lot 800. It has been prepared as per the requirement of Condition B21 of the major project approval for Seascape Grove subdivision at South West Rocks.

A number of management actions have been listed which aim to achieve positive environmental outcomes and the listed performance criteria for the conservation area. These include tubestock planting, weed control, instillation of nest boxes, fencing and provision of fauna crossings. An implementation plan has been prepared to guide the timing and completion of the required actions.

Implementation of these actions will allow potential threats to the conservation areas to be effectively managed. Ongoing monitoring and reporting will provide feedback as to the success of the management actions and whether and changes in management techniques are required.

8. References

Atkinson, G. (1999). Soil Landscapes of the Kempsey - Korogoro Point 1:100,000 Sheet map and report. NSW Department of Land and Water Conservation, Sydney.

Darkheart Eco-Consultancy (2007) Statutory Ecological Impact Assessments of Proposed Residential Subdivision of Lot 124, DP 1097510, Belle O'Connor St, South West Rocks. Darkheart Eco-Consultancy, Kew.

Kenny, B., Sutherland, E., Tasker, E. and Bradstock, R. (2012). Guidelines for Ecologically Sustainable Fire Management. NSW National Parks and Wildlife Service, Hurstville, NSW.

VicRoads (2012). Fauna Sensitive Road Design Guidelines. VicRoads, Cobram, Victoria.

Appendix 1 – Monitoring Proforma

Vegetation Field Survey Form (20x20m Plot)

Project Name:	**Date:**	**Plot #:**
Project Description:		
Surveyors:	**Position of start marker in plot**: e.g. NW corner	
Vegetation Community:		
Vegetation Condition:	**EEC:** Y / N	

Record easting and northing from the starting plot marker.

Attribute (20x20m plot)		**Sum values**
Count of **Native Richness**	**Trees**	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of **Cover o**f native vascular plants by growth form group	**Trees**	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Native Species Cover %		
Weed Species Cover %		
High Threat Weed Cover %		

Plot Attributes	**None** (tick)	**Minimal** (tick)	**Major** (tick)	**Comments**
Pollution, litter				
Soil erosion				
Adjacent weeds (likely to impact rehab area)				
Plant pests or diseases				
Feral animals				
Clearing				
Grazing				
Fire damage				
Storm damage				
	Good (tick)	**Fair** (tick)	**Poor** (tick)	**Comments**
Tree hollows				
Natural recruitment				
Macrofauna use (scats, tracks)				
Microfauna use (insects, lizards)				
Overall habitat value				

Vegetation Structure

Strata	**Form**	**Height range**	**Cover**	**Species 1**	**Species 2**	**Species 3**
Emergent						
Canopy						
Midstory 1						
Midstory 2						
Shrub						
Ground						

Form Key – Tree, Fern, Shrub, Sedge, Forb, Vine, Grass

Additional Notes:

Survey Name:	Date:
Surveyors:	Plot:

#	GF Code	Species Name	N, E or HTE	Cover	Abund	Dominant top 3 in each stra.
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
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41						
42						
43						
44						
45						
46						
47						

Cover: 0.1, 0.2, 0.3, …, 1, 2, 3, …, 10, 15, 20, 25, …100% (foliage cover). **Note:** 0.1% cover represents an area of approx.. 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approx.. 1.4 x 1.4 m, and 1% = 2 x 2 m, 5% = 4 x 5 m, 25% = 10 x10 m. **Abundance:** 1, 2, 3, …, 10, 20, 30, …, 100, 200, …, 1000, …