Bushland Management Plan

2a Ruskin Rowe, Avalon Beach NSW 2107

Prepared for Sanberg Schoffel Architects

August 2019

Issued By	Position	Role
Narla Environmental	Project Ecologist	Report Compilation
		**Must Print in A3*

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Objectives

The overall objective of this Bushland Management Plan (BMP) is to provide a working document to protect, maintain and enhance native vegetation within the Subject Site, and provide effective framework for the removal of all priority and environmental weeds.

This BMP aims to guide best-practice native vegetation management and rehabilitation works within the Subject Site, in order to mitigate impacts from the proposed construction, including to:

- Achieve the relevant objectives identified within the Pittwater LEP 2014, which include:
  - Protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values.
  - Provide for a limited range of development that does not have an adverse effect on those values.
  - Provide for residential development of a low density and scale, integrated with the landform and landscape and not visually prominent.
  - Encourage development that retains and enhances riparian and foreshore vegetation and wildlife corridors.
  - Ensure the continued viability of ecological communities and threatened species.

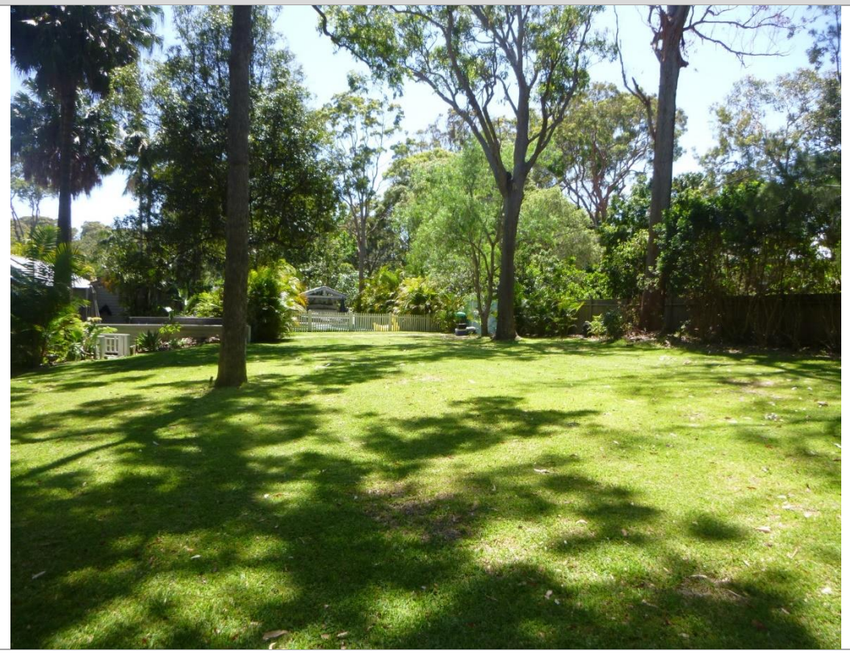
- Remain consistent with other related environmental legislation and policies, including the *Biodiversity Conservation Act 2016* (BC Act), *Biosecurity Act 2015* (Bio Act), and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);

- Provide effective mitigation measures for the impact of the development within the Subject Site, such as:
  - Protection and enhancement of remnant vegetation within the Subject Site;
  - Eradication of priority and environmental weed species;
  - Establishment of self-sustaining and diverse indicative native vegetation assemblage of local provenance species (Swamp Sclerophyll Forest EEC) throughout the Subject Site; and
  - Reduction and maintenance of exotic plant species populations to low levels of growth and cover.
  - Creek bank stabilization and rehabilitation.

VEGETATION MANAGEMENT ZONES

Zone 1 – Swamp Sclerophyll Forest EEC

Total proposed area: 1537 m²



Description

Management zone 1 encompasses all vegetated areas of the subject site excluding the creek line. This zone is currently comprised of remnant Swamp Sclerophyll Forest EEC comprising of *Eucalyptus botryoides, Eucalyptus robusta* and *Livistona australis*, which has been historically planted out with exotic vegetation typical of an urban backyard.

The vegetation within this zone was deemed to be of low quality due to historic clearing and low-moderate weed infestations including:

- *Ageratina adenophora*
- *Ageratina riparia*
- *Asparagus aethiopicus*

Management Requirements

Weed Control

- Removal and Control of all priority weeds that occur within the zone.
- All weed removal is to be conducted by a suitably qualified person (i.e. gardener or bush regenerator).

Appointing of a Project Ecologist

- Before any tree removal works occur a project ecologist must be appointed to oversee all tree clearing in order to safely capture, treat and relocate any native fauna that may be present.

Landscaping

- All future landscaping within this zone is to comprise of 100% locally indigenous species representative of the Swamp Sclerophyll Forest EEC (**Appendix A**).

Tree Replacement

- Native revegetation efforts within this zone are to be undertaken to offset tree removal as a result of the proposed development with locally sourced, native nursery stock representative of the indigenous vegetation community, Swamp Sclerophyll Forest EEC (**Appendix A**).
- The minimum number of canopy trees to be planted within this zone is six (6) trees. This number will ensure a 1:2 replacement ratio is achieved for the three (3) native canopy trees to be removed.
- Plantings are to be conducted by a suitably qualified person (i.e. gardener or bush regenerator).

Replacement Hollow installation

- To compentsate for the loss of two (2) small hollows as a result of the proposed development, augmented hollows or nest boxes will be installed through this zone at a 1:2 ratio to ensure a net increase in potential habitat across the site.
- All nest boxes are to be installed using best practice by a qualified professional with a suitable working at heights qualification.
- Must be installed prior to any removal of hollow-bearing trees.

Zone 2 – Creek Stabilisation

Total proposed area: 130m²

Description

Management zone 2 encompasses the unmapped creek that runs from the south western corner of the site through to the north eastern corner. The vegetation through this zone is comprised of scattered *Livistona australis* with large quantities of urban exotic vegetation. This zone is experiencing heavy erosion impacts due to frequent high levels of water flow.

The vegetation within this zone was deemed to be of low quality due to high levels of erosion, accompanied by significant levels of exotic vegetation, such as:

- *Anredera cordifolia*
- *Setaria palmifolia*
- *Tradescantia fluminensis*

Management Requirements

Appointing of a Project Ecologist

- Before any creek works occur a project ecologist must be appointed to oversee works within this zone in order to safely capture, treat and relocate any native aquatic fauna that may be present.

Creekbank Stabilisation

- All damming and dewatering in order to accommodate for creek stabilisation is to be done under the supervision of the Project Ecologist.
- All rocks that are removed from within the creek as a result of the proposed works must be relocated elsewhere to ensure no net loss in potential sheltering habitat.
- An appropriate sediment and erosion control plan is to be in place at all times during any construction activities in case of sediment run off into the creek.

Weed Control

- Removal and Control of all priority weeds that occur within the zone.
- All weed removal is to be conducted by a suitably qualified person (i.e. gardener or bush regenerator).

Landscaping

- All future landscaping within this zone is to comprise of 100% locally indigenous species representative of the Swamp Sclerophyll Forest EEC (**Appendix A**).

VEGETATION MANAGEMENT ZONES

Figure 1. Management Zones within the Subject Site

ONGOING MANAGEMENT ACTIONS

Maintenance and Monitoring

The following performance criteria should be undertaken within the Management Zones on the Subject Site. Narla have proposed that monitoring be undertaken for at least five years. The successful completion of these management actions will be monitored by a qualified professional who will provide an annual report each year that addresses the condition of the Management Zones during that monitoring year, in comparison to previous years. The first report will comprise baseline data from which all future monitoring reports can be compared against.

Performance Criteria

Objective		Key Performance Indicator (KPI)	How will this KP be Assessed	Designated time to meet KPI	If KPI cannot be met by designated time
1.1	Eradicate all priority weeds (Management Zones 1 and 2)	Priority weeds to be completely removed from both Management Zones by the end of the first year.	This is determined by the Project Ecologist through a site walkover and assessment.	Within One year of commencement of this BMP.	Double the amount of site visits by suitably qualified persons until this KPI is met.
1.2	Installation of augmented hollows/nest boxes (Management Zone 1)	All augmented hollows/nest boxes are installed prior to any habitat trees being removed by a suitably qualified professional with appropriate working at heights qualifications.	This is determined by the Project Ecologist through a site walkover and assessment.	Prior to any habitat tree removal.	Habitat tree removal cannot commence until this KPI is met.
1.3	Replace all trees removed with nursery-reared stock (Management Zone 1)	Trees scheduled for removal are to be replaced with local equivalent trees representative of the Swamp Sclerophyll Forest EEC (**Appendix A**) at a 1:2 ratio.	This is determined by the Project Ecologist through a site walkover and assessment.	Within 6 months of tree removal.	Suitably qualified person (i.e. gardener or bush regenerator) is to be contracted immediately in order to meet revegetation commitment.
1.4	On-going survival of native tree replacement plantings	100% survival rate of all tree replacement plantings installed within management zone 1 over the life of this BMP.	This is determined by the Project Ecologist through a site walkover and assessment.	On-going basis for life of this BMP	A suitably qualified person (i.e. gardener or bush regenerator) must be contacted in order to replace all plants that have not survived the initial establishment phase of the BMP. Replacement plantings must ensure adherence to the vegetation management requirements outlined.
1.5	Landscaping	All future landscaping within both zones is to comprise of 100% locally indigenous species representative of the Swamp Sclerophyll Forest EEC (**Appendix A**).	This is determined by the Project Ecologist through a site walkover and assessment	On-going basis for life of this BMP	N/A

WORK SCHEDULE / TIMING

Task	Steps Involved	Time Required	Responsibility	Scheduling (Years from the date of adoption of this VMP)					
				Year 1	Year 2	Year 3	Year 4	Year 5	Ongoing
Appointment of relevant contractors	Appointment of a Qualified Project Ecologist	N/A	Land Owner Project Manager						
	Appointment of a suitably qualified gardener or Bush Regenerator								
	Appointment of suitably qualified nest box installer								
Installation of augment hollows/nest boxes	All hollows lost will be replaced at a 1:2 ratio with augmented hollows or nest boxes of the same size through management zone 1. Installation to be supervised by an Ecologist.	Must be installed prior to the removal of any hollow bearing trees.	Land Owner Project Manager						
Weed/Exotic Vegetation Management	Primary Weed removal	TBA – as quoted by Gardener or Bush Regeneration Contractors	Gardener or Bush Regeneration Contractors						
	Follow-up Weed Control and Suppression	TBA – as quoted by Gardener or Bush Regeneration Contractors	Gardener or Bush Regeneration Contractors						
Ecologist Supervision	Ecologist must be on site during all tree clearing and creek works in order to capture, treat and relocate any native fauna that may be impacted.	During all tree clearing and creek works	Project Ecologist						
Revegetation	Installation of locally indigenous trees to replace all trees being removed (**Appendix A**).	Within 6 months of tree removal	Gardener or Bush Regeneration Contractors						
	Maintenance of plantings	As required based on climatic conditions, expertise of Gardener or Bush Regeneration Contractors and findings of the annual monitoring program.	Gardener or Bush Regeneration Contractors						
Landscaping	All future landscaping within both zones is to comprise of 100% locally indigenous species representative of the Swamp Sclerophyll Forest EEC (**Appendix A**).	On going for the life of this BMP	Landscape Architect Gardener or Bush Regeneration Contractors						
Formal Monitoring and Reporting	Assess progress of remediation works	Annually: 1 person/1-day Project Site visit, 20hrs for reporting	Project Ecologist						

3. Management Actions applicable to all Management Zones:

3.1 Assigning a Project Ecologist

- Prior to commencement of any vegetation clearing, creek works, weed removal or construction works on the subject site, a Project Ecologist must be assigned to oversee relevant works and ensure the proponent is adhering to the recommendations of the Biodiversity Impact Assessment Report (Narla 2019). The Project Ecologist must as a minimum:
    - Hold a relevant tertiary degree in Science, Biology, Ecology, Environmental Science, Environmental Management or Natural Resource Management,
    - Be fully licensed under the Biodiversity Conservation Act 2016 (or equivalent) and,
    - Be fully licensed with a NSW Animal Research Authority (or equivalent) permitting the handling, relocation and humane euthanasia of all terrestrial fauna.

3.2 Assigning a Suitably Qualified Gardener or Bush Regeneration Contractor

- All works associated with native vegetation and or flora providing habitat, including weed management are to be implemented by a fully qualified and experienced Gardner or Bush Regeneration Contractor with familiarity with experience working in Swamp Sclerophyll Forest EEC.

3.3 Weed Management

- Weed management is to be undertaken throughout both Management Zones, targeting weed infestations and ensuring no weed encroachment into surrounding vegetation.
- Weed management is to be undertaken in accordance with quotation provided by a qualified gardener or bush regeneration professionals and controlled to levels deemed acceptable by the Project Ecologist
- All weeds removed are to be bagged, removed from site and disposed of at a registered waste facility.

Performance Criteria

- The following Biosecurity Act 2015, listed 'Priority Weeds' were located within the Subject Site
    - *Anredera cordifolia*
    - *Asparagus aethiopicus*
- All priority weeds present within both Management Zones are to be completely removed; and
- Annual and environmental weeds maintained to low levels (not spreading or impacting native plant species growth or regeneration).

3.4 Landscaping

- All future landscaping within both management zones is to comprise of 100% local nursery stock representative of the Swamp Sclerophyll Forest EEC (**Appendix A**).

3.5 Hygiene Protocol

- Phytophthora and Myrtle Rust are pathogens which can be spread through infected soil, with potentially large detrimental impact. The risk to biodiversity related to each pathogen has resulted in them being listed as 'Key Threatening Processes' under the BC Act 2016.
- As a precautionary measure, hygiene procedures are essential across the site.
- Such hygiene protocols have the additional benefit of limiting the potential to facilitate the introduction or spread of weed propagules to the subject site, which can be costly to manage later.
- Basic principles include avoiding transport of sediment onto and off site by cleaning all work clothing, gloves, tools and machinery. In some cases, a solution of 70% ethanol or methylated spirits in 30% water may be sufficient to disinfect equipment prior to use.
- The report, 'Arrive Clean, Leave Clean' (Commonwealth of Australia 2015) provides further information and best practice methods to reduce spread of these pathogens between work Subject Sites.

3.6 Erosion Control

- In pre-emptive action, adequate erosion and sediment measures will be in place at all times during construction activities in case of minor sediment run off and/or disruption to soil profiles.
- Preceding construction works, the 'Blue Book' (Landcom 2004) should be consulted to ensure any additional necessary erosion controls are adequately installed.
- Appropriate sediment fencing should be installed around the construction area prior to any excavation or tree root-ball removal.

3.7 Pre-Clearing Survey and Fauna Management

- A qualified Project Ecologist with experience in handling wildlife should be present on the Subject Site to conduct a pre-clearing survey prior to the removal of any trees to check for the presence of fauna that may be utilising vegetation as habitat.
- Pre-clearing survey should be undertaken no less than 8 hours prior to clearing to identify any nesting birds or sheltering fauna that require relocation
- An Ecologist should be on site during all tree clearing and creek works to advise best practice tree felling protocol and capture, treat and/or relocate any fauna that have been displaced during tree/vegetation removal works.

3.8 Stormwater Management

- Sedimentation and erosion control measures should be put in place during the entire construction of the proposed activity. It is recommended that the sedimentation and erosion control measures be taken from 'The Blue Book' 'Managing Urban Stormwater: Soils and Construction' (Landcom 2004).

2. Zone Specific Management Actions:

1.1 Zone 1 – Swamp Sclerophyll Forest EEC

- All trees (including dead trees) should be felled by qualified Arborists using chainsaw and pulleys only. No heavy machinery is permitted for removal of any tree unless otherwise agreed to by the Project Ecologist.
- A qualified Project Ecologist with experience in handling wildlife should be present on the Project Site during all vegetation clearing in order to supervise clearing and capture and relocate any displaced, healthy animals, or care for / rehabilitate any injured or orphaned animals.
- Tree protection zones should be clearly delineated for trees to be retained. Delineation should be marked out by the consulting Arboriculturalist.
- Six (6) replacement trees are required to replace the three (3) native trees proposed for removal to fulfil a 1:2 replacement ratio. Trees must be representative of the Swamp Sclerophyll Forest EEC (**Appendix A**)
- To compentsate for the loss of two (2) small hollows as a result of the proposed development, augmented hollows or nest boxes will be installed through this zone at a 1:2 ratio to ensure a net increase in potential habitat across the site. Hollows must be installed prior to any removal of hollow bearing trees.

1.2 Zone 2 – Creek Stabilisation

- A qualified Project Ecologist with experience in handling wildlife should be present on the Project Site during all creek works in order to capture and relocate any displaced, healthy animals, or care for / rehabilitate any injured or orphaned animals.
- A suitable erosion and sediment control plan is to be implemented prior to any works commencing within the creek.

2. Monitoring Specifications

3.1 Monitoring Details

- Vegetation monitoring is to be completed on an annual basis (during Spring) by a suitably qualified Ecologist or Bush Regeneration Professional;
- General site-specific photographs should be collected within each zone;
- Floristics within each quadrat are to include:
    - weed densities within each vegetation layer (ground, mid-strata, canopy);
    - full species list including native and weed species; and,
    - percentage of tree replacement plantings that have survived.

4. Reporting

- Annual bushland management reports are to be produced annually (during Spring) by an Ecologist and is to include;
    - A summary of annual weed management works;
    - A site assessment based on performance targets;
    - Presentation of photographic evidence to illustrate progress of weed management and native regeneration
    - Any management issues/recommendations required to meet performance targets
    - Update work specifications as required to meet performance targets
    - Management/maintenance requirements or recommendations to inform any subsequent management of the Site (beyond the 1st year maintenance period).
- This Bushland Management Plan must be reviewed by a qualified Ecologist at least every five years from the date of its adoption, or more regularly if required by Pittwater Council.

5. References

- Bangalay (Ecological and Bushfire) and East coast Flora Survey (2011) Pittwater Native Vegetation Classification, pre-1750 Vegetation Mapping and Vegetation Profiles. Report prepared for Pittwater Council.
- Commonwealth of Australia (2015) Arrive Clean, Leave Clean
- Landcom (2004) Managing Urban Stormwater: Soils and Construction
- Narla Environmental Pty Ltd (2019) Environmental Impact Assessment Report for 2A Ruskin Rowe, Avalon Beach, NSW 2107.

Appendix A. Recommended landscaping and revegetation species list (Bangalay (Ecological and Bushfire) and East Coast Flora Survey 2011)

Habit	Species	Common Name
Tree	*Eucalyptus botryoides*	Bangalay
	Casuarina glauca	Swamp Oak
	Eucalyptus robusta	Swamp Mahogany
Small Tree	*Melaleuca linariifolia*	Flax-leaved Paperbark
	Synoum glandulosum subsp. glandulosum	Scentless Rosewood
	Glochidion ferdinandi	Cheese Tree
Palm	*Livistona australis*	Cabbage Tree Palm
Shrub	*Astrotricha latifolia*	Broad-leaf Star Hair
	Homolanthus populifolius	Bleeding Heart
	Breynia oblongifolia	Coffee Bush
	Trema tomentosa var. viridis	Native Peach
	Notelaea longifolia	Large-leaved Olive
Ground Fern	*Todea barbara*	King Fern
	Calochlaena dubia	Rainbow Fen
	Pteridium esculentum	Bracken
	Cyathea australis	Rough Tree Fern
Sedge	*Gahnia clarkei*	Tall Saw-sedge
Twiner	*Sarcopetalum harveyanum*	Pearl Vine
	Pandorea pandorana	Wonga Vine
	Cissus hypoglauca	Giant Water Vine
	Eustrephus latifolius	Wombat Berry

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