

Bushfire and Vegetation Management Plan – 4 Fleet St, Salamander Bay NSW

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1.0 Bushfire and Vegetation Management Plan Objectives

The purpose of this Bushfire and Vegetation Management Plan (BVMP) is to define and outline the implementation and management of vegetation required within the approved Asset Protection Zone (APZ), whilst incorporating best practice management of vegetation, fauna and bushfire compliance within the BVMP lands.

This BVMP is to be read in conjunction with:

Eco Logical Australia (2013). *Vegetation Management Plan for Colonial Ridge retreat Asset Protection Zone, Salamander Bay*. Unpublished report for Colonial Ridge Retreat, March 2013. and,

Cumberland Ecology (2018). Fleet Street, Salamander Bay Flora and Fauna Assessment, for Eden at Wander Beach, August 2017 Draft Report. and,

Australian Bushfire Protection Planners (2017). Bushfire Protect Assessment for the Proposed change of use on Lots 1 - 50 in DP 285191, No. 4 Fleet Street, Salamander Bay 2017. And,

NSW RFS General Terms of Approval (Ref: D18/760), 11 May 2018.

The overall BVMP objectives are to provide:

- Vegetation of the characteristic assemblage of biota where the structural and trophic complexity is adequately representative and able to self-replenish without further intervention other than maintenance;
- A long-term environmental conservation area requiring nominal ongoing maintenance.
- To assess and adjust weeding and management regimes across the BVMP lands in compliance with the asset protection zone;
- Areas of habitat for native flora and fauna, including Powerful Owl, Koala and *Corybas dowlingii* which have been recorded as occurring;
- Erosion and sediment control measures to ensure no transfer of soil and sediments into the surrounding areas; and
- The establishment and management of the approved Asset Protection Zone including Inner Protection Area (IPA).

1.1 Proposal

The study area is located in Salamander Bay between Fleet Street and Raymond Avenue and adjoins Stoney Ridge Reserve. The Study Area comprises approximately 5.76ha of land, including the proposed APZ (0.95ha) within the Port Stephens Local Government Area (LGA). The approved development includes construction of a Seniors Living complex with a multistorey apartment building, villas, care-takers cottage, swimming pool, internal roads and carparks. The approved APZ land of 50m along the western boundary zone has been assessed by ELA (2013)

and Cumberland Ecology (2018) and identified threatened biodiversity. Endangered Ecological Community Swamp Sclerophyll Forest on Coastal Floodplain occurs outside the APZ land and will not be impacted, threatened flora recorded included *Callistemon linearifolius* (Netted Bottlebrush) and *Corybas dowlingii* (Hooded Orchid), and threatened fauna species including *Phascolarctos cinereus* (Koala) and *Petaurus norfolcensis* (Squirrel Glider). This BVMP prescribes measures for vegetation management within the approved APZ that aims to maintain identified threatened biodiversity values, whilst still achieving bushfire fuel reduction in accordance with the NSW Rural Fire Services (RFS) planning for Bushfire Protection (2019).

Figure 1 shows the site location and **Appendix A** shows the proposed development.

1.2 BVMP Lands

The BVMP lands (approx. 0.95ha) occur immediately west of the development footprint boundary of R2 – Low Density Residential lands of Lot 2 DP 791551, 4 Fleet Street Salamander Bay within E2 – Environment Conservation of Stoney Ridge Reserve. The development footprint will not be included in this BVMP as the majority of the site includes managed gardens and lawns. Consideration of the vegetation that is within and adjoins the Subject Site to the west and north revealed that the vegetation is considered 'Forest Hazard' (west) and 'Rainforest Hazard' (north), refer to Figure 4 of the approved BTA. The Asset Protection Zones are wholly located within the BVMP lands.

1.3 Existing Site Conditions

Eco Logical Australia completed detailed assessments in 2013 including vegetation community validation, vegetation surveys, random meander, targeted threatened flora surveys. Cumberland Ecology inspected the site in 2017 completing verification of the current condition onsite and further flora surveys mainly focusing on the approved APZ.

These inspections included general site reconnaissance and traversal to verify mapped vegetation communities, to achieve a comprehensive vegetation assessment of the BVMP lands as well as the broader site has allowed us to confirm that vegetation onsite consists of:

- **Coastal Sheltered Apple-Peppermint Forest (MU11)**

The Coastal Sheltered Apple- Peppermint Forest occurs within the Study area, occupying an area of 2.06ha.

The canopy was dominated by *Eucalyptus piperita* (Sydney Peppermint) and *Angophora costata* (Smooth-barked Apple), with subdominants including *Corymbia gummifera* (Red Bloodwood) and *Eucalyptus resinifera* (Red Mahogany). The understory was dominated by *Allocasuarina littoralis* (Black Oak) and regenerating canopy species. The shrub layer comprises dense regenerating *Dodonaea triquetra* (Hop Bush) that appears to be post-fire generation, *Platylobium formosum* (Handsome flat pea), *Acacia ulicifolia* (Prickly Moses), *Pimelea linifolia* (Rice Flower), *Pteridium esculentum* (Bracken Fern) and *Phyllanthus hirtellus* (Thyme

Spurge). The ground layer included *Dianella caerulea* (Blue Flax Lilly), *Lomandra longifolia* (Spiny headed Mat-rush), *Brunoniella australis* (Blue trumpet) and *Lepidosperma laterale*.

- **Swamp Mahogany- paperbark Forest (MU 37)**

The Swamp Mahogany- Paperbark Forest occurs within the Study area and occupies an area of 0.87ha.

Canopy species included *Eucalyptus resinifera* and *Melaleuca quinquenervia* (Broad-leaved paperbark). Although *Eucalyptus robusta* (Swamp Mahogany) often occurs as dominant within this association, this species did not occur in high abundance. A dense understory and shrub layer occurred comprising of *Glochidion ferdinandi* (Cheese Tree), *Leptospermum polygalifolium* (Tea Tree), *Pittosporum undulatum* (Wavy Pittosporum), *Melaleuca sieberi* (Siebers Paperbark) and *Callistemon linearifolius*. The ground layer was dominated by *Gahnia clarkei* (Saw Edge), *Dianella caerulea*, and vines such as *Hardenbergia violacea* (False Sarsaparilla) and *Smilax glycyphylla* (sweet Sarsaparilla).

This community qualifies as *Swamp sclerophyll forest on Coastal floodplains of the NSW North Coast, Sydney Basin and South Coast Bioregions* EEC and has been confirmed as containing *Callistemon linearifolius*, a vulnerable species listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act).

- **Cleared/Managed land/Not mapped lands**

The remaining un-vegetated portion of the study area is cleared for walking trials or the existing APZ.

- **Threatened Flora**

Two threatened species of flora were identified within the BVMP lands including *Callistemon linearifolius* (Netted Bottlebrush) and *Corybas dowlingii* (Red Helmet Orchid). two records of A total of twenty-seven (27) *Callistemon linearifolius* were recorded within the Study Area, one in the proposed APZ and an additional five (5) recorded directly adjacent to the Study Area.

Three (3) orchid species were found to occur within the Subject site and were found to be in association and co-occurred in clumps including *Corybas dowlingii*, *C. fimbriatus* and *Acianthus fornicates*. One of these species *Corybas dowlingii* (Red Helmet Orchid), is listed as endangered species under the TSC Act.

Figure 2 shows ground-truthed vegetation boundaries. **Figure 3** outlines the proposed management zones and areas impacted by the development.

2.0 Management of BVMP Lands

The priority for the BVMP lands is APZ fire management in accordance with Rural Fire Service General Terms of Approval and APZ Guidelines. The BVMP has been developed and revised from feedback with Port Stephens Council and Dr Stephen Bell to ensure compliance with the APZ guidelines and to prioritise the protection of Powerful Owl and Koala, along

with management of *Corybas dowlingii* which is present within the site. Regeneration of the BVMP Lands will be undertaken over a period of six (6) years or until the Year 6 overall targets are reached. Management of the site will be undertaken in perpetuity (in accordance with the Conditions of Consent).

2.1 Inner Protection Zone

In accordance with the Planning for Bush Fire Protection 2019 (PBP) the management of the Inner Protection Areas (IPAs) is where vegetation is kept to a minimum level. Litter fuels within the IPA should be kept below 1cm in height and be discontinuous. When establishing and maintaining an IPA the following requirements apply:

- Trees tree canopy cover should be less than 15% at maturity;
- Trees at maturity should not touch or overhang the building;
- Lower limbs should be removed up to a height of 2m above the ground;
- Tree canopies should be separated by 2 to 5m;
- Preference should be given to smooth barked and evergreen trees;
- Shrubs create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided;
- Shrubs should not be located under trees; shrubs should not form more than 10% ground cover;
- Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation; and
- Grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and leaves and vegetation debris should be removed.

2.2 Management Zones

To ensure compliance with the above the BVMP Lands will be managed in two zones, retained trees (approx. 15% canopy cover) and grasses. **Figure 3** shows the two areas.

- **Grass (lawn)** - this zone is located where there are no retained trees or shrubs. Ensuring management complies with Asset Protection Zone measures. Management actions are focused on reducing fuel loads to prescribed levels.
- **Retained Trees and Orchid Protection Zones** – this zone features the retention of important habitat trees (identified in **Figure 3**). These trees feature hollows providing nesting opportunities for mobile fauna including Powerful Owls within the Subject Site.

3.0 Regeneration Targets

Given the BVMP lands primary focus is Asset Protection the targets for regeneration are highly restricted. Hence the primary focus within the BVMP land is weed management and this is reflected in the targets in **Table 1**.

Weeds have significant impact on structural integrity of vegetation communities. Flora surveys identified the following weeds present; *Lantana camara* (Lantana), *Asparagus asparagoides* (Asparagus Fern) and *Chrysanthemoides monilifera* (Bitou Bush) that will be the focus of weed management activities, based on listings under the *Biosecurity Act 2015*.

Table 1 – Targets for Cover and Diversity.

Regeneration Targets	Cover of Native (%)	Cover of Priority Weeds (%)	Cover of Environmental Weeds (%)
Year 1	10	<60	<60
Year 2	20	<50	<50
Year 3	30	<30	<40
Year 4	50	<20	<30
Year 5	65	<10	<25
Year 6	70	<5	<20

4.0 Vegetation Regeneration

4.1 Site Preparation

Prior to the commencement of regeneration, the BVMP Lands must be prepared. The following works have been recommended to assist in site preparation:

- Establishment of pathogen and disease controls. Appropriate hygiene controls are to be employed to minimise the chances of any such introduction occurring. This may include a hygiene station to clean boots, tools and machinery. Response plans are needed to be designed and implemented to mitigate impacts in the event of disease or pathogen outbreaks.
- Clearly mark native vegetation for retention and approved removal;
- Removal of rubbish and all barbed wire;
- Install temporary fence around the BVMP Lands, and clearly mark as a “No Go Area”;
- Fencing should have clearly visible signage erected at key entry points to BVMP;

- Implement Erosion and Sediment control measures in accordance with specifications set out in the latest edition of the Landcom publication “Soils and Constructions – Volume 1 (The Blue Book);
- Vegetation Clearance procedures (refer to Section 5 of this BVMP for detailed procedures);
- Clearing of vegetation;
- Establish monitoring and photo point;
- Determine Baseline Data; and
- Primary weed removal;

As the vegetation within the BVMP Lands is located within a built-up area regular, therefore bushfires are not required to maintain ecological function.

4.2 Weed Management

Weed Control works within each Management Zone are to be undertaken by a qualified bushland regeneration team using industry standards (summary provided in **Table 2**).

Any reproductive material of weeds, including weeds which can spread vegetatively, or seeds, must be taken off site to be disposed of at an appropriate local waste collection service. No weed material with the potential of spreading must be piled within the Subject Site, or the BVMP Lands.

The *Biosecurity Act 2015* outlines several ‘duties’; the general biosecurity duty, and additional duties under mandatory measures, regional measures, prohibited matter or biosecurity zone. Specific action for these measures may be required. Weed control is required to occur in the following sequence:

1. **Primary Weeding** – this is where weeds are removed from Management Zones.
2. **Consolidation** – over the next few months, the weed control zones will require monthly visits to remove weeds that are regenerating and/or have grown in response to the disturbance and are competing with planted and regenerating native plants. These visits are essential, otherwise the weeds will recolonise, dominate and inhibit the regeneration of native species.
3. **Maintenance Weeding** – After the six-month and will continue on a monthly basis, due to woody weeds, and other annual weeds being problematic within the locality.

This interval will be evaluated based on-site condition during each monitoring period. Weed control works across the site are to be undertaken over the maintenance period of five (5) years, however given the adaptive management approach, this time-frame is flexible, and may need to be extended based on changing site conditions and results indicating management zones have reached targets set out in this BVMP.

Environmental and noxious weeds known from the existing APZ and surrounding bushland such as *Lantana camara* (Lantana), *Asparagus asparagoides* (Asparagus Fern) and *Chrysanthemoides monilifera* (Bitou Bush). Hand weeding and cut and paint techniques should be used to respond to any weed issues rather than spraying to avoid impacts on orchids.

Appropriately trained bushland regenerators are to control weeds so that they do not have a deleterious effect on threatened species or EEC.

4.3 Specific Zone Management

The BVMP lands cover approx. 0.95ha and has been divided into three management zones based on their values and objectives for the zone, allowing targeted actions. The preferential retention of hollow bearing trees and preferred Koala feed trees throughout the proposed APZ are likely to minimise impacts on the threatened and migratory fauna species.

Each of the three Zones has specific management requirements to ensure the targets for an increase in native flora and a decrease in weed within the BVMP Lands can be achieved significantly improving the biodiversity values.

4.4 Bushfire Protection Measures

The proposed development is classified as a 'Special Fire Protection Purpose Development' with an approved Asset Protection Zone of 50m. The APZ is a fuel-reduced area surrounding a building or structure. It is located between the building or structure and the bush fire hazard. In forest vegetation, the APZ can be made up of an Inner Protection Area (IPA) and an Outer Protection Area (OPA). For this APZ, however the GTAs require the entirety of the APZ (50m) to be managed to IPA standards.

Refer Section 2.1 and 2.2.

5.0 Vegetation Clearing

For the clearing phase, retained vegetation will be delineated by safety bunting flags, fencing and signage indicating environmental protection zone, which will still allow fauna to egress the development area as needed. Following the completion of clearing works, a permanent fence made from demarcation bollards is to be installed to protect the retained vegetation during operational phase of the development;

- Vegetation clearing should be timed to avoid cold weather periods where overnight temperatures are forecast to be less than 12°C. Cold weather is likely to make it difficult for resident hollow dependent fauna to successfully relocate. This is particularly relevant for low body-weight species;
- Vegetation clearing should avoid the *Corybas dowlingii* flowering period (June through August);

- Avoidance and mitigation measures for the breeding pair of Powerful Owls recorded within the proposed APZ need to be assessed prior to clearing by Project Ecologists:
 - Clearing should not be undertake between May - September to ensure it occurs outside of breeding season and to give time for the owlets to fledge.
 - Inspection of roost tree and suitable nesting trees must be undertaken by Project Ecologist 48 hours prior to clearing to determine if in use, if nesting is occurring clearing will not commence until Owls are no longer using the nest;
 - Surveys will also determine the fledging status of the Powerful Owl and if the owlets are not fledged clearing will be postponed until they are fledged; and
 - Phased Clearing measures (see details below) must be undertaken to reduce impacts on roosting Powerful Owls within or adjacent to the APZ.
- A staged approach to clearing is to be undertaken to provide fauna the opportunity to disperse outside the area of impact. Staging to include Phase 1 Clearing: Reduction of groundcover by Rubber-tracked Mulcher down to 30cm, Phase 2 Clearing: Further groundcover clearing by bush regeneration contractors on foot, Phase 3 Clearing: Removal of non-habitat trees, and Phase 4 Clearing: Removal of habitat and connecting trees;
- All clearing works (phase 1-4) to be undertaken under the supervision of the Project Ecologist;
- There is to be at least one night between Phase 3 clearing finishing and Phase 4 commencing;
- Clearing should occur in a direction from previously disturbed lands towards retained lands;
- Implement clearing protocols, including pre-clearance surveys to identify habitat and vegetation to be retained;
- All clearing works to be attended by a suitable equipped and experienced ecologist to deal appropriately with any displaced fauna species;
- All hollow bearing features will be sectionally lowered by tree climbers (where safe to do so);
- Any fauna rescued during vegetation clearing is to be assessed for injuries, and subsequently released to a suitable nearby location; this may require holding fauna until dusk for release in accordance with relevant animal ethics licencing and standards;
- If any fauna is injured during vegetation clearing, they are to be taken promptly to a nearby veterinarian or suitable wildlife carer contact;
- In addition, prior to clearing of any vegetation, an ecologist is to inspect the area for any signs of resident fauna requiring attention, and in

particular nesting birds. Where such is identified, appropriate strategies are to be developed and instigated to minimise impacts.

- Pre-clearance surveys to include diurnal surveys, stagwatching and nocturnal surveys;
- Civil Construction staff to be inducted into pre-clearing and clearing protocols, and to identify environmental features for protection;
- Installation of nest boxes within the retained lands prior to construction to mitigate the removal of HBTs within the development footprint and provide supplementary roosting / nesting habitat for resident fauna species that utilise such features.
- Any suitable hollows recovered during clearing works should be reconditioned into suitable hollows and installed in retained lands in addition to the manufactured nest boxes; and
- All cleared vegetation is to be mulched on site and spread to help stabilise any exposed soil and minimise offsite movement of biomass. Fallen timber and hollow logs identified to be retained to be relocated into the retained lands.

6.0 Fauna Management and Clearing Procedures

6.1.1 Threatened Fauna

The following four threatened fauna species have been recorded on site (ELA 2012); Powerful Owl (*Ninox strenua*), Koala (*Phascolarctos cinereus*), Little Bent-Wing (*Miniopterus australis*) and East Coast Freetail Bat (*Mormopterus norfolkensis*). In addition to these, ELA 2012, identified seven threatened and two migratory fauna species that are considered likely to occur in the Study area.

6.1.2 Feral Animals

No significant evidence of feral animals was observed on site; however, it is likely that rabbits are present in the local area. Therefore, protection guards should be placed around new growth where appropriate so that the BVMP lands are not compromised by grazing. If monitoring within management zones indicates pest species pose notable impediments to achieving the aims of the BVMP (i.e., through excessive browsing, etc.), then management actions will be reviewed to address these issues.

7.0 Project Management

Establishment of monitoring point and compliance checking of other aspects within this BVMP will be the responsibility of the Project Ecologist working with the Civil Contractor.

The client will be responsible for the engagement of a suitably qualified Bush Regeneration Contractor to undertake weed control and

management works outlined in this BVMP. The Project Ecologist will be responsible for the establishment of monitoring points within the BVMP lands along with collection of baseline data that will be monitored against this over the six-year period of this BVMP with the overall targets. The Project Ecologist will be responsible for monitoring and reporting on weed management, and Regeneration Approach success.

7.1 Monitoring

Monitoring will occur every two years for a six-year basis at the proposed monitoring points (refer **Figure 3**), covering:

- Weed coverage and effectiveness of control methods;
- Coverage of native species; and
- Evaluation of management effectiveness.

7.2 Reporting

A report is to be prepared biannually and delivered to the consent authority for the life of the BVMP with a final report prepared at the end of the BVMP outlining how the conditions of the BVMP have been met.

Corybas dowlingii monitoring period is every two years for a six-year period will inform the evaluation of management effectiveness (noting that the expert report states that this species will decline), and recommendations to adapt management will be made, until the Weed targets are met.

As part of adaptive management, the reports will include evaluations and recommendations relating to all areas covered in the monitoring schedule and also address any other problems or deficiencies found during monitoring. If required the report should also outline any changes that are required to planned works to ensure better ecological outcomes.

- A summary of the methods (including area covered, dates and time spent on the task) and results of the survey.
- Maps showing the area covered, the extent and approximate abundance of *Corybas dowlingii* within the APZ.
- Any recommendations for changes to management and monitoring.

Any observations including new species, observations of threatened species, maintenance required, comments on rates of regeneration of native and weed species and problems beyond the scope of the BVMP which impact on native vegetation, including ECC's.

Table 2 – Weed Control Activities.

.Activity	Minimum Requirement
Pre-works	Undertake baseline surveys to identify priority weeds present on site to be the focus of weed management activities. Priority weeds based on listings under the <i>Biosecurity Act 2015</i> , and notably problematic weeds on site have been identified, and listed in Section 3.2.
Primary Works	Effectively control priority species and areas through appropriate methods to eliminate highly competitive weeds from an area. Include high disturbance activities that could negatively impact later regeneration such as high-volume herbicide application, and physical removal of large trees which would pose safety hazards to the public or others if left to perish <i>in-situ</i> .
Secondary Works	Treat any regrowth from primary weed control and expand on control measures by targeting Priority species and expanding the primary control boundaries where desirable. Thin retained weeds to increase light penetration where appropriate. Generally, expand on and solidify primary work.
Maintenance Works	Maintain exclusion of weeds controlled during Primary and Secondary works. Prevent reinfestation of weeds progressively, and others as time permits.
Woody Trees & Shrubs	Where appropriate, remove trees via mechanical means (i.e. chainsaw or handsaw) and apply chemical to the cut stump. Material may be retained on-Site or disposed of appropriately off-Site. Retained material should be situated to provide additional ground habitat and slope stability but should not be left in such a way that would hamper natural regeneration or existing native plants. Care should be taken with species which have the capacity to regrow vegetatively such as <i>Erythrina x sykesii</i> (Coral Tree). Alternatively, trees and shrubs may be treated via frill or drill application of herbicide and left to perish <i>in-situ</i> as habitat.
Woody Thickets	Treat via cut or scrape and paint or high-concentration low-volume foliar herbicide control (i.e. splatter application). Material may be left <i>in-situ</i> (particularly after spraying) or broken up and rafted off the ground to perish (taking care to remove from expected high flow areas of the creek). Do not manually remove root stock in a manner that will encourage soil instability or erosion. Once dead, standing material may be broken down and left on the ground as mulch. Mechanical removal (i.e. brush cutter equipped with mulching blade or similar) may be used where practical and regrowth treated with foliar application of herbicide.
Vines and Creepers	Skirt from trees and vegetation to prevent smothering and leave material to perish <i>in-situ</i> . Cut or scrape and paint stems or runners. Foliar herbicide control where appropriate. Do not unduly expose soil via manual removal of plants where they may be providing soil stabilisation. Isolated manual removal as appropriate.
Ground Cover	Retain exotic species where they are providing ground stabilisation or habitat until such time as they hinder native species establishment or are no longer necessary. Relevant examples include retaining <i>Tradescantia fluminensis</i> (Trad) along drainage lines where removal would expose bare soil to erosion. Weed control is to focus on the patch removal of such weeds from around native regeneration or planting, with progressive removal of larger patches over time.
Retention of forage/habitat	Retain trees and shrubs that have evidence of occupation i.e., bird nest/possum drey, until such time as other suitable habitat is available or the nest is abandoned. Retain manageable clumps of vegetation that can be easily removed at a later date for intermediate food and habitat supply within the semi-cleared and disturbed landscape, which will emerge between weed control and establishment of native plants.
	These retained features can be removed as they become redundant at the discretion of the Bush Regeneration Contractor (BRC).

Table 3 – Proposed Works Schedule.

Action	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Pathogen and disease controls																								
Pre-clearance surveys, marking of trees for retention and delineation of clearing extent with No-Go area																								
Install appropriate sediment and erosion controls																								
Phase 1 clearing – groundcover removal including rubbish and barbed wire removal																								
Phase 2 clearing – additional groundcover removal																								
Phase 3 clearing – non-HBT removal																								
Phase 4 clearing – HBT removal																								
Set up Monitoring Plot and Photo Points																								
Collection of Baseline Data after APZ works																								
Install fencing, bollards and signage																								
Feral Animal controls (where required)																								
Primary Weeding																								
Secondary Weed Control and maintenance																								
Tertiary Weed Control and maintenance																								
Monitoring of BVMP																								
Monitoring of Fencing, Erosion and sediment controls	These should be checked annually for the life of the BVMP and after heavy rainfall events (rainfall >25mm) to ensure they are still operational																							
Reporting																								Final Report

Disclaimer: While all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

Legend

 Study Area

 Cadastre



Notes:
1. Boundaries are not survey accurate
2. Do not scale off the plan



AEP

Title: Figure 1 - Site Location

Date: Apr 2022

Location: Fleet Street, Salamander Bay

Client: Steven Lambourne

AEP ref: 2501.01

Disclaimer: While all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

Legend

-  Study Area
-  Cadastre
-  Bushfire and Vegetation Management Plan (BVMP) Lands
-  PCT 1646 - Smooth-barked Apple - Blackbutt - Old Man Banksia woodland on coastal sands of the Central and Lower North Coast



0 20 40 m

Note:
1. Boundaries are not survey accurate
2. Do not scale off the plan



AEP

Title: Figure 3 - Groundtruthed Vegetation

Date: Apr 2022

Location: Fleet Street, Salamander Bay

Client: Nelson Property

AEP ref: 2501.01

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Legend

- Bushfire and Vegetation Management Plan (BVMP) Lands
- Cadastre
- Retained Canopy (0.1214ha)
- Corybas under Retained Trees
- Grass Area (0.83ha)
- 20m Owl Roost Tree clump buffer
- Indicative Sign Location
- ★ Indicative Monitoring Location
- Retained HBT
- Retained Owl Roost Tree
- Retained Tree
- Retained Koala Feed Tree



0 50
metres



AEP

Title: Figure 3 - Vegetation Management Zones (VMZ)

Date: Sept 2023

Location: Fleet Street, Salamander Bay

Client: Steven Lambourne

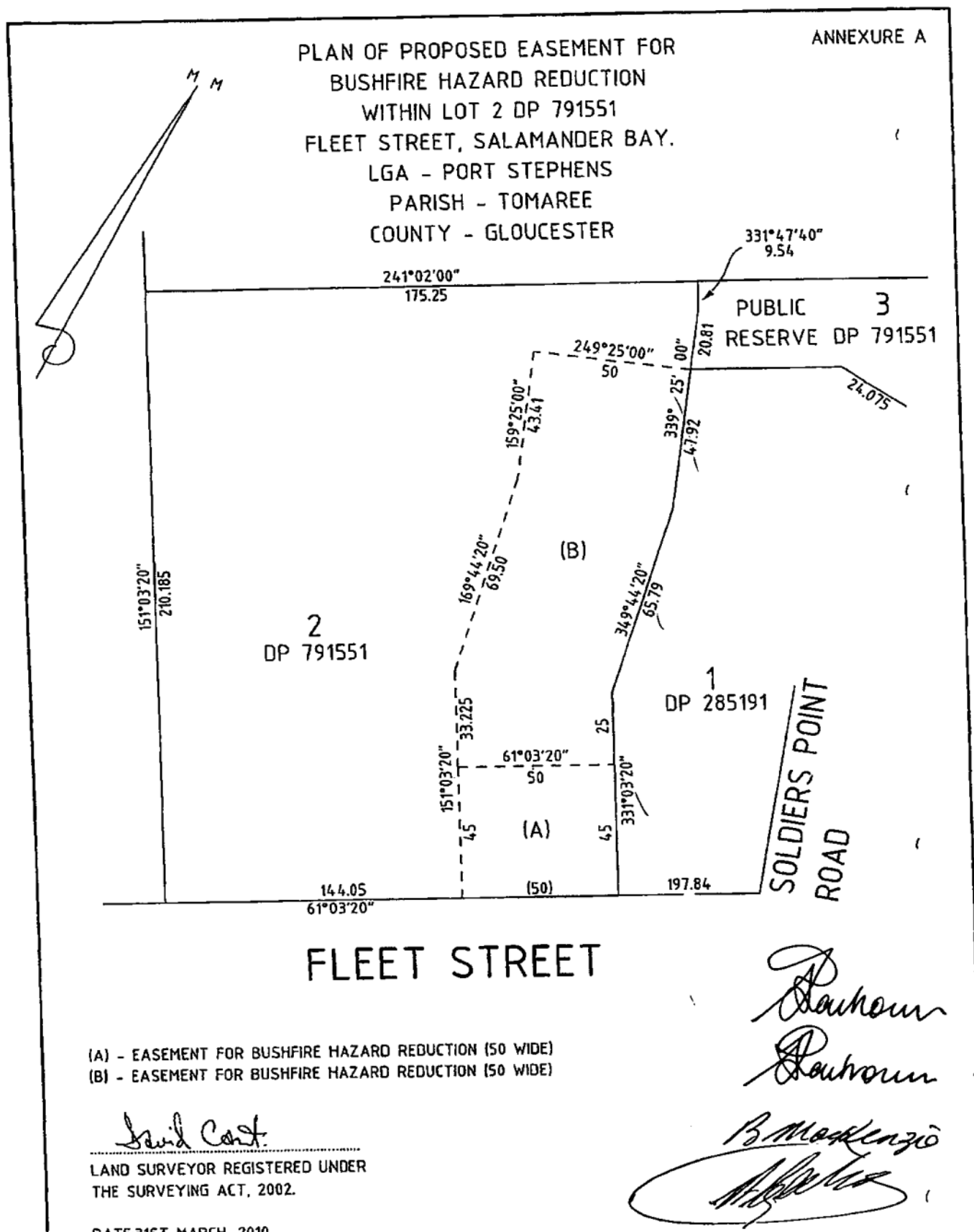
AEP Ref: 2501.01

Notes:
1. Boundaries are not survey accurate.
2. Do not scale off this map.

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Appendix A – Asset Protection Easement



Appendix B – BMP Lands Signage

NO UNAUTHORISED ENTRY

This is a Vegetation Rehabilitation Area

- **NO DUMPING or WASTE DISPOSAL**
- **NO ANIMALS, VEHICLES or
MACHINERY**

For information – contact Site Manager

Appendix C – Consent Conditions

Condition No	Condition	Section in BVMP
Port Stephens Council Development Consent – 16-2018-121-1		
5. Prior to the issue of the Construction Certificate		
5	Prior to the issue of a Construction Certificate or prior to the commencement of any vegetation clearing works a revised version of the Vegetation Management Plan (VMP) prepared by Eco Logical dated 2013 must be prepared for the asset protection zone area as defined in the VMP on Lot 2 DP 791551 and be titled Bushfire and Vegetation Management Plan (BVMP). The BVMP shall be submitted and approved by Port Stephens Council prior to issuing of the construction certificate. The BVMP shall be prepared by a suitably qualified and experienced ecological and bushfire consultant with experience in the preparation of such reports. The BVMP must:	
5a	Comply with the requirements of the NSW RFS General Terms of Approval (Ref: D18/760 and dated 11 May 2018) and Bushfire Protect Assessment prepared by Australian Bushfire Protection Planners dated 2017 or updated version.	Section 3.4 and Figure 2
5b	Include relevant information and any mitigation measures from the Ecological Assessments prepared by Eco Logical dated 2013 and Cumberland Ecology dated 2018.	Section 1.3, 2.0 and 3.0
5c	Be prepared in accordance with the Port Stephens Council Technical Specification Vegetation 2014.	Refer to Appendix E.
5d	Include a tree plan and schedule for all trees to be retained that displays the tree number, scientific name, common name, age class, significance i.e. hollow bearing tree/ koala feed tree and any specific comments or recommendations.	Refer to Arb assessment and Figure 3
5e	Address any threatened species specific requirements.	Section 1.3, 5, 6.1.1
5f	Include a maintenance schedule.	Section 3 and Table 3
5g	Include a monitoring plan that includes submission of monitoring reports to Council after initial clearing works are completed; annually for two years post completion of the clearing works and 5 yearly thereafter throughout the occupation and use of the development.	Table 3

Appendix D – Tree Protection Plan

Tree Protection Plan

Proposed Seniors Living Development
Lot 2 DP791551 Fleet St, Salamander Bay, NSW



**Prepared for: Stephen Lambourne
c/ Perception Planning**

6 September 2023

AEP Ref: 2501.02

Revision: 02

Document Control

Document Name	Tree Protection Plan for Lot 2 DP791551 Fleet St, Salamander Bay.
Project Number	2501.02
Client Name	Stephen Lambourne
AEP Project Team	Warwick Muir Jeremy Burrill

Revision

Revision	Date	Author	Reviewed	Approved
00	20/04/2022	Jeremy Burrill	Warwick Muir	Warwick Muir
01	20/04/2022	Jeremy Burrill	Warwick Muir	Warwick Muir
02	06/09/2023	Chris Wark	Warwick Muir	Warwick Muir

Distribution

Revision	Date	Name	Organisation
00	20/04/2022	Erin Daniel	Perception Planning
01	02/05/2022	Erin Daniel	Perception Planning

Disclaimer

Direct observations are relevant only to the trees identified within this report. This report utilizes a rapid assessment of tree health and condition to inform retention value. This assessment of tree health and condition is based on non-destructive visual observations from ground level. Thus, it is not possible to identify all structural faults at high levels in the tree, internal structural faults or within the root system. Observations about Tree Health, Structure, SULE and other characteristics have been made at the time of assessment and these characteristics may change over time due to natural growth of the tree as a living organism or due to unforeseen events. As such the observations that are supplied within are relevant for a period of 12 months from the time of assessment, after which re-assessment may be required for the trees assessed within this report. The recommendations and methodologies for Tree Protection within this report are relevant only to the Trees assessed within this report. The author is not responsible for tree damage related to failure to apply these recommendations or methodologies for Tree Protection in full within this report or for tree damage relating to works conducted by an unaffiliated person. No responsibility for damage to persons or property is accepted for damage by trees referred to within this report.

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Appendix A– Tree Schedule

Appendix B– SULE Methodology

Appendix C – Site Photographs

Appendix D - Tree Protection Fencing

1.0 Introduction

1.1 Background

At the request of the Stephen Lambourne C/- Perception Planning (the client), Anderson Environment & Planning (AEP) have prepared an assess the arboricultural suitability for retention and outline Tree Protection methodologies for Trees within a Bushfire Asset Protection Zone (APZ) adjacent to the proposed construction of a residential subdivision. The report assesses the impact of the proposal at, Lot 2 DP791551 Fleet St, Salamander Bay, NSW.

1.2 Objectives

Further to the above the following objectives for this report have been assigned:

- Tree identification plan and schedule identifying hollow bearing tree species, size, canopy spread and the like;
- Visual Assessment of all identified hollow bearing trees within proposed development areas and required Asset Protections Zones (APZ's) including, but not limited to, the health and vigour of the trees, structural integrity, life expectancy, retention value and landscape significance;
- Likely impact the proposed development will have on hollow bearing trees to be retained including TPZ and SRZ encroachments; and
- Tree protection plan and methodologies throughout the development for all Hollow Bearing Trees to be retained.

2.0 Site Description and Locality

- **Location** – Fleet St, Salamander Bay, NSW.
- **Title** – Lot 2 DP791551.
- **LGA** – Port Stephens Council.
- **Zoning** – Under the Port Stephens *Local Environmental Plan 2013* (the LEP), the Subject Site Area is zoned C2 – Environmental Conservation and R2 – Low Density Residential.
- **Subject Site** – comprises the Bushfire and Vegetation Management Lands (BVMP) Lands.
- **Current Land Use** – Lot 2 DP791551 the site was previously operated as a tourist facility with bush to the rear of the facility. All buildings, roads and other associated infrastructure are present however not in use. an existing. The bush area to the rear of the Subject Site is mostly unmanaged with walking trails.
- **Surrounding Land Use** – The Study Area is mostly residential with small tourist facilities within nearer to the bay.

3.0 Proposed Development

The proposed development includes construction of a Seniors Living complex with a multistorey apartment building, villas, care-takers cottage, swimming pool, internal roads and carparks and Asset Protection Zones.

Figure 1 depicts the location of the site and **Figure 2** shows a concept plan for the proposed development.

Disclaimer: While all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

Legend

 Study Area

 Cadastre



Notes:
1. Boundaries are not survey accurate
2. Do not scale off the plan



AEP

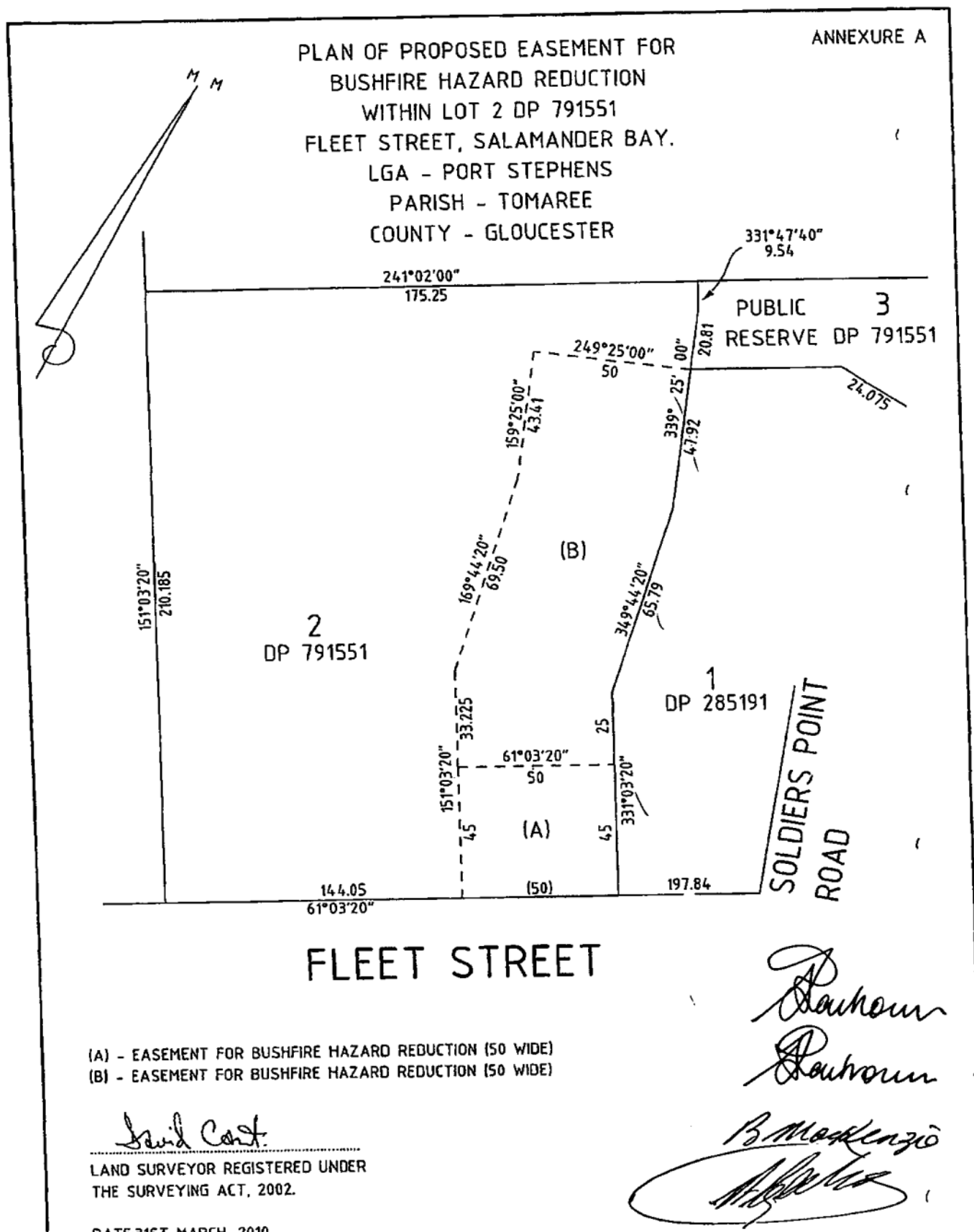
Title: Figure 1 - Site Location

Date: Apr 2022

Location: Fleet Street, Salamander Bay

Client: Steven Lambourne

AEP ref: 2501.01



4.0 Methodology

The site inspection was undertaken on the 6th April 2022. Each Hollow Bearing Tree assessed within the subject site was tagged with an orange plastic tag. Tree species were identified based on guidance from regional identification guides (Fairley and Moore 1989, Robinson 2003), and descriptions and records provided by the Royal Botanic Gardens (Plantnet 2022). Photos included within this report were taken at the time of assessment.

A previous ecology report prepared by Cumberland Ecology (August 2017) which identified Hollow-Bearing trees located within the subsection site was reviewed, and the Hollow bearing Trees within identified within that report were assessed within this report. Any additional HBTs identified were also included.

4.1 Visual Tree Assessment

A visual tree assessment to evaluate the health and condition of these trees in relation to the impacts of the proposed development was undertaken from ground level following the methodology described by Mattheck and Breloer (1994). Tree height was estimated following the guidance outlined in the Private Native Forestry Code of Practice (DECC 2007) and confirmed with a laser range finder. The Diameter at Breast Height (DBH) and Diameter Above Buttress (DAB) was determined using a DBH tape and methods of calculation for the Structural Root Zone (SRZ) and Tree Protection Zone (TPZ) applied as outlined in Australian Standard 4970-2009 *Protection of trees on development Sites* (AS 4970 – 2009) (Standards Australia 2009). Tree Total Canopy Area was estimated from the formula $\pi \times (\text{average canopy spread})^2$.

4.2 SULE

The SULE method (Safe Useful Life Expectancy) estimates the suitability of the tree in the urban landscape based on the species and age of the subject tree (Barrell 1996). The following ranges have been allocated to each assessed tree:

- Greater than 40 years (Long);
- Between 15 and 40 years (Medium);
- Between 5 and 15 years (Short);
- Dead, dying, suppressed, defective or damaged (Remove); and
- Less than 5m in height or 15years of age (Young or small tree).

A full explanation of SULE methodology is included in **Appendix B**.

4.3 Tree Retention Value

To determine tree Retention Value a Landscape Significance Rating (LSR) was assigned to each tree. The LSR value provides consideration of the trees amenity, environmental and heritage values (refer **Appendix A**). Trees are then assigned one of the following LSR categories:

- Significant (1);
- Very High (2);
- High (3);
- Moderate (4);
- Low (5);
- Very Low (6); and

- Insignificant (7).

Once the landscape significance value has been determined the following assessment matrix that utilises estimated life expectancy and landscape significance (**Table 1**) was applied to each tree.

Table 1: Tree Retention Status Matrix Assessment matrix adopted from Morton (2006).

Landscape significance rating							
Estimated Life Expectancy	1	2	3	4	5	6	7
Greater than 40 Years							
15 to 40 Years			Moderate				
5 to 15 Years			Low				
Less than 5 Years					Very low		
Dead or Hazardous							

4.4 Limitations

This report utilises a rapid assessment of tree health and condition to inform retention value. Should a detailed assessment of tree structural health and condition be required a tree risk assessment report should be commissioned.

This assessment of tree health and condition is based on non-destructive visual observations from ground level. Thus, it is not possible to identify all structural faults at high levels in the tree, internal structural faults or within the root system. Should a detailed assessment for structural faults be required a tree risk assessment report should be commissioned.

Weather conditions such as extreme wind, storm activity, lightning as well as other events or disturbances independent of the proposed activities are unpredictable. Unforeseeable damage to trees may occur as a result of unpredictable or unplanned weather events or disturbances.

Tree identifications are based on identifying features (fruit, inflorescence, etc.) found and made at ground level from within the subject site during April.

The total canopy area for each tree utilised within this report is an estimation based on field observation of canopy spread and the true amount of canopy area may differ.

Trees identified by this plan are located to GPS accuracy and there may be some minor discrepancy in the true location.

Impact assessment was based to limited concept design confined to identification of the approximate proposal footprint at the time of preparation of this report. Variation of this concept design will alter some of the recommendations and this report should be updated to reflect these changes.

5.0 Tree Assessment Results

A total of 23 Hollow Bearing Trees within the site were tagged and assessed. Observations were made for each assessed tree (**Appendix A, Table 2**). Hollow Bearing Tree locations are shown in **Figure 3**.

To distinguish from previous tree tagging undertaken within the subject site, each assessed tree within this report was re-tagged with an orange plastic tag and marked “HBT” along with the corresponding number as per this report.

5.1 Summary of Tree Condition and Characteristics

A total of 23 trees were assessed within an area of remnant native vegetation throughout the entirety of the subject site. The Plant Community Type identified within the Subject Site was *PCT 1646 - Smooth-barked Apple - Blackbutt - Old Man Banksia woodland on coastal sands of the Central and Lower North Coast*. The following landscape significance ratings (LSRs) have been applied to the assessed trees;

- Twenty- three (23) ‘Very High’, due to canopy size, visual prominence, good form or habitat value.

With consideration of the estimated life expectancy for each tree, Retention Values were assigned to each tree within the site. This identified;

- 16 ‘High’, and
- 7 ‘Low’ Retention value trees (These trees have been determined to be dead or hazardous)

One (1) tree (Tree HBT4) was noted to be in Poor structural condition with large amounts of decay (an entire central decayed column) and insect /fire damage, a hollowed-out base and lean to the east. Basic VTA determined that decay within the base of this tree exceeds 50% of the remaining wood.

Hollows or other habitat features were noted in all 23 assessed trees.

Disclaimer: While all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

Legend

- Site Boundary
- Tree Locations



HBT23

HBT22

HBT21

HBT20

HBT19

HBT18

HBT16 HBT17

HBT15

HBT13

HBT14

HBT12

HBT11

HBT10

HBT9

HBT7

HBT6

HBT8

HBT5

HBT4

HBT2

HBT3

HBT1

0 10 20 30 40 m

Note:

1. Boundaries are not totally accurate.
2. Do not scale off the map.



AEP

Title: Figure 3 - Tree Locations

Date: Apr 2022

Location: Fleet Street, Salamander Bay

Client: Steven Lambourne

AEP ref: 2501.01

6.0 Discussion

6.1 Ecological Value

Hollows, large stick nests or other habitat features were observed within all trees assessed. These features provide suitable animals such as arboreal mammals, microbats, small birds and Forest Owls potential habitat locations. Additionally, these features add to the value of the tree and therefore gains a higher landscape significance rating.

7.0 Tree Impact Assessment

7.1 Proposed development impact

A total of seven (7) assessed trees will require removal as they are potential hazards to contractors working within the site and any future site users. These include:

- Seven (7) Very Low Retention Value Trees (Trees HBT2, 4, 8 12, 13, 15, 18 and 19).

Of these trees, six have been identified as standing dead (Stag Trees), whilst one (Tree HBT 4) is in Poor structural condition with a high number of significant structural defects that preclude the safe retention of this tree.

The other sixteen (16) assessed trees of High Retention value that are within the APZ which are able to be retained through tree protection measures for the duration of the development providing this complies with Bushfire requirements. These trees can be retained without pruning works, with trees with touching canopies retained as pairs and >3m from other retained trees.

Of the remaining 16 trees, all should have a continuous TPZ fence installed with a radius equal to the TPZ outlined in Appendix A, to prevent accidental ingress during clearing works.

Further retention of unassessed trees should be considered with preference given to:

- Smooth Barked species (*Angophora costata*) over rough-bark or part-bark species;
- Large, Mature Specimens; and
- Koala Feed Tree Species.

Additional retention and potential pruning works within the Bushfire APZ should be at the discretion of the Bushfire Consultant for this Site.

8.0 Recommendations

8.1 Tree Retention and Removal

- Trees identified for retention within the BVMP were determined based on ecology requirements, as outlined in Section 6.1 with consideration to Bushfire APZ requirements and the assessment of health in Schedule 1 of this report. The HBTs to be retained (as per the BVMP) are to be protected during clearing, as outlined in Section 8.2.
- All removal of unassessed trees should be conducted by a qualified tree worker in accordance with AS4373 –2007 Pruning of Amenity Trees in a manner that limits impacts upon retained trees or threatened ground flora.
- Where possible, unassessed trees should be retained in a manner consistent with a Bushfire APZ requirements, under the direction of the bushfire consultant for this project.
- Unassessed trees that are to be retained as per Figure 3 of the BVMP should have a continuous TPZ fence installed out to the radius of the TPZ, calculated by $12 \times \text{DBH}$ with a maximum of 15m.

8.2 Tree Protection Measures

- All tree maintenance and pruning works should be carried out by a qualified tree worker in accordance with AS4373 –2007 Pruning of Amenity Trees.
- The TPZ shall be delineated by a 1.8m interlocking chain wire fence located around trees designated to be retained within close proximity to the Works, in accordance with AS 4687. **Appendix D** details tree protection fencing that should be implemented.
- TPZ fencing must be installed before the commencement of any Works. The fencing should not be removed or altered until after the completion of works.
- All Contractors working in close proximity to the TPZ of Trees to be retained should be briefed as to the requirements of the Tree Protection Zone.
- The TPZ fencing and zone should be certified by the project arborist before construction commences.
- Tree health and condition should be monitored by the project arborist at regular stages during construction, at practical completion of construction, and after completion.
- Tree tags should remain in place on retained trees until after tree removal, construction and tree pruning works have been completed.
- The following activities should be avoided within the TPZ of trees to be retained where practicable:
 - Machine excavation of soil including trenching;
 - Operation of heavy equipment;
 - Stockpiling of soils;
 - Storage of heavy or other equipment;
 - Parking of vehicles;
 - Wash down and cleaning of equipment;
 - Excavation for silt fencing;
 - Dumping of waste;
 - Change of soil level or gradient; and
 - Covering with concrete, impermeable, or compacted surfaces.

8.3 Other Recommendations

- Clothing, equipment and boots should be clean and sanitised prior to each site visit to prevent onsite introduction of plant pests and diseases such as Myrtle rust.
- Vehicles and construction equipment should utilise designated entry and egress points to avoid potential of impacts on Trees to be retained.

9.0 Conclusion

Hollow Bearing Trees identified for retention in the BVMP (Figure 3) will result in the removal of 13 trees and retention of 10 trees. The 10 trees are to be retained within the APZ with Standard Tree Protection Measures. The additional 12 non-HBTs are to be retained with Standard Tree Protection Measures.

We trust this meets your requirements. Should you require further details or clarification, please do not hesitate to contact the author of the report (0448 689 698) or Natalie Black Senior Environmental Manager (0431 249 360).

Yours faithfully,



Warwick Muir

Ecologist / Arborist

BSc AQF5

10.0 References

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Appendix A– Tree Schedule

Tree ID	ID (Cumberland Ecology 2019)	Scientific Name	Common Name	DBH (m)	DAB (m)	Canopy Spread (m)				Canopy Spread Average (m)	Estimated Total Canopy Area (m ²)	Height (m)	SULE	Age Class	Health	Structure	Landscape significance rating	Estimated life expectancy	Retention Value	TPZ (m)	SRZ (m)
						N	E	S	W												
HBT1	8	<i>Eucalyptus umbra</i>	Broad-leaved White Mahogany	1.1	1.12	6	7	6	6	6.25	123	10	Moderate (15-40)	Mature	Fair	Good	Very High	15-40	High	13.2	3.5
HBT2	6		Stag	0.45	0.5	0	0	0	0	0	0	8	Short (5-15)	Over-mature	Dead	Dead	Very High	Dead or Hazardous	Very low	5.4	2.5
HBT3	7	<i>Angophora costata</i>	Smooth-barked Apple	0.38	0.4	6	5	6	5	5.5	95	9	High (40+)	Mature	Fair	Fair	Very High	40+	High	4.56	2.3
HBT4	3	<i>Eucalyptus umbra</i>	Broad-leaved White Mahogany	0.7	0.75	6	7	6	6	6.25	123	12	Remove (<5)	Over-mature	Poor	Poor	Very High	Dead or Hazardous	High	8.4	2.9
HBT5	5	<i>Angophora costata</i>	Smooth-barked Apple	0.72	0.78	4	4	5	4	4.25	57	12	High (40+)	Mature	Fair	Fair	Very High	40+	High	8.64	3.0
HBT6	4	<i>Angophora costata</i>	Smooth-barked Apple	0.43	0.45	3	6	3	4	4	50	10	Moderate (15-40)	Mature	Good	Fair	Very High	40+	High	5.16	2.4
HBT7	2	<i>Eucalyptus umbra</i>	Broad-leaved White Mahogany	0.47	0.48	6	4	6	8	6	113	12	Moderate (15-40)	Mature	Fair	Fair	Very High	15-40	High	5.64	2.4
HBT8	1		Stag	0.35	0.32	0	0	0	0	0	0	8	Remove (<5)	Over-mature	Dead	Dead	Very High	Dead or Hazardous	Very low	4.2	2.1
HBT9	10	<i>Angophora costata</i>	Smooth-barked Apple	0.52	0.6	6	6	6	6	6	113	12	High (40+)	Mature	Good	Fair	Very High	40+	High	6.24	2.7
HBT10	9	<i>Eucalyptus umbra</i>	Broad-leaved White Mahogany	0.45	0.48	6	6	6	6	6	113	9	Short (5-15)	Mature	Poor	Poor	Very High	15-40	High	5.4	2.4
HBT11	17	<i>Eucalyptus umbra</i>	Broad-leaved White Mahogany	0.55	0.65	7	8	8	8	7.75	189	12	Moderate (15-40)	Mature	Fair	Fair	Very High	40+	High	6.6	2.8
HBT12	16		Stag	0.4	0.4	0	0	0	0	0	0	10	Remove (<5)	Over-mature	Dead	Dead	Very High	Dead or Hazardous	Very low	4.8	2.3
HBT13	24		Stag	0.2	0.01	0	0	0	0	0	0	8	Remove (<5)	Over-mature	Dead	Dead	Very High	Dead or Hazardous	Very low	2.4	0.5
HBT14	18	<i>Eucalyptus umbra</i>	Broad-leaved White Mahogany	0.75	0.85	8	9	8	9	8.5	227	14	Moderate (15-40)	Mature	Good	Fair	Very High	40+	High	9	3.1
HBT15	11		Stag	0.95	0.85	0	6	6	0	3	28	12	Remove (<5)	Over-mature	Dead	Dead	Very High	Dead or Hazardous	Very low	11.4	3.1

Tree ID	ID (Cumberland Ecology 2019)	Scientific Name	Common Name	DBH (m)	DAB (m)	Canopy Spread (m)				Canopy Spread Average (m)	Estimated Total Canopy Area (m ²)	Height (m)	SULE	Age Class	Health	Structure	Landscape significance rating	Estimated life expectancy	Retention Value	TPZ (m)	SRZ (m)
						N	E	S	W												
HBT16	23	<i>Angophora costata</i>	Smooth-barked Apple	0.28	0.28	4	4	4	4	4	50	9	High (40+)	Mature	Fair	Good	Very High	40+	High	3.36	1.9
HBT17	22	<i>Corymbia gummifera</i>	Red Bloodwood	0.5	0.55	8	6	7	6	6.75	143	12	Moderate (15-40)	Mature	Good	Fair	Very High	40+	High	6	2.6
HBT18	20		Stag	0.45	0.45	0	0	0	0	0	0	15	Remove (<5)	Over-mature	Dead	Dead	Very High	Dead or Hazardous	Very low	5.4	2.4
HBT19	19		Stag	0.5	0.5	0	0	0	6	1.5	0	11	Remove (<5)	Over-mature	Dead	Dead	Very High	Dead or Hazardous	Very low	6	2.5
HBT20	13	<i>Allocasuarina torulosa</i>	Forest Oak	0.45	0.55	5	4	3	4	4	50	14	Moderate (15-40)	Mature	Good	Good	Very High	15-40	High	5.4	2.6
HBT21	14	<i>Angophora costata</i>	Smooth-barked Apple	0.45	0.55	4	4	3	6	4.25	57	14	High (40+)	Mature	Good	Fair	Very High	40+	High	5.4	2.6
HBT22	12	<i>Eucalyptus pilularis</i>	Blackbutt	0.9	0.98	8	9	2	9	7	154	15	High (40+)	Mature (30%-80%)	Fair	Fair	Very High	40+	High	10.8	3.3
HBT23	21	<i>Eucalyptus pilularis</i>	Blackbutt	0.9	0.98	12	8	6	6	8	201	15	Moderate (15-40)	Mature (30%-80%)	Fair	Fair	Very High	40+	High	10.8	3.3

Appendix B– SULE Methodology

SULE (Safe Useful Life Expectancy)

In planning context, the time a tree can expect to be usefully retained is the most important long-term consideration. SULE i.e. a system designed to classify trees into a number of categories so that information regarding tree retention can be concisely communicated in a non-technical manner. SULE categories are easily verifiable by experienced personnel without great disparity. A tree's SULE category is the life expectancy of the tree modified first by its age, health, condition, safety and location (to give safe life expectancy), then by economics (i.e. cost of maintenance: retaining trees at an excessive management cost is not normally acceptable), effect on better trees, and sustained amenity (i.e. establishing a range of age classes in a local population). SULE assessments are not static but may be modified as dictated by changes in tree health and environment. Trees with a short SULE may be at present by making a contribution to the landscape but their value to the local amenity will decrease rapidly towards the end of this period, prior to their being removed for safety or aesthetic reasons.

SULE Methodology

1. Long SULE - tree appeared retainable at the time of assessment for over 40 years with an acceptable degree of risk, assuming reasonable maintenance;

- A. Structurally sound trees located in positions that can accommodate future growth.
- B. Trees which could be made suitable for long term retention by remedial care
- C. Trees of special significance which would warrant extraordinary efforts to secure their long-term retention.

2. Medium SULE- tree appeared to be retainable at the time of assessment for 15 to 40 years with an acceptable degree of risk, assuming reasonable maintenance;

- A. Trees which may only live from 15 to 40 years.^{[1][2][SEP]}
- B. Trees which may live for more than 40 years but would be removed for safety or nuisance reasons.
- C. Trees which may live for more than 40 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting.
- D. Trees which could be made suitable for retention in the medium term by remedial care.

3. Short SULE - tree appeared to be retainable at the time of assessment for 5 to 15 years with an acceptable degree of risk, assuming reasonable maintenance:

- A. Trees which may only live from 5 to 15 years.^{[1][2][SEP]}
- B. Trees which may live for more than 15 years but would be removed for safety or nuisance reasons.
- C. Trees which may live for more than 15 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting.
- D. Trees which require substantial remediation and are only suitable for retention in the short term.

4. Removal - trees which should be removed within the next 5 years;

- A. Dead, dying, suppressed or declining trees.
- B. Dangerous trees through instability or recent loss of adjacent trees.
- C. Dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form.
- D. Damaged trees that are clearly not safe to retain.^{[1][2][SEP]}

E. Trees which may live for more than 5 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting.

F. Trees which are damaging or may cause damage to existing structures within the next 5 years.

G. Trees that will become dangerous after removal of other trees for the reasons given in (a) to (f).

H. Trees in categories (a) to (g) that have a high wildlife habitat value and, with appropriate treatment, could be retained subject to regular review.

5. Small, young or regularly pruned - Trees that can be moved or replaced;

A. Small trees less than 5m in height.

B. Young trees less than 15 years old but over 3m in height.

C. Formal hedges and trees intended for regular pruning to artificially control growth.

GLOSSARY

Age Classes

- Juvenile refers to an immature tree.
- Semi-mature refers to a tree between immaturity and full size.
- Mature refers to a full-sized tree with some capacity for further growth.
- Over-mature refers to a tree already in decline.

Diameter at breast height (DBH)

Tree stem diameter at 1.4 metres above ground level.

Diameter at buttress (DAB)

Tree stem diameter as measured above the root buttress at ground level.

Tree Protection Zone (TPZ)

An indicative measure of the area necessary to protect for tree viability, encompassing the area necessary to protect both the crown and woody roots as calculated by the formula $TPZ = DBH \times 12$

Structural Root Zone (SRZ)

An indicative measure of the spread of the primary woody and structural roots necessary for tree stability, as calculated by the formula $SRZ = (DAB \times 50)^{0.42} \times 0.64$

Visual Tree Assessment (VTA)

Visual inspection of tree only.

Co-dominant leaders

A tree where two or more stems are of similar diameter.

Included Bark Junctions

A junction where the angle of the union creates an area of ingrown bark. This can create a structural weakness, and is often found on co-dominant stems.

Crown

The portion of the tree consisting of branches and leaves and any part of the trunk from which branches arise.

Stem

The position of the tree consisting of branches and leaves and any part of the trunk from which branches arise. An organ which supports branches, leaves, flowers and fruits.

Epicormic Growth

Refers to shoots produced by dormant buds within the bark or stem of a tree as a result of stress, incorrect pruning or increased light.

Health Condition

Exceptional

- Visually complete crown with dense foliage throughout that indicates strong health and vigour.
- Leaf size and colour that is true to type for the species and free from pest (insect) and disease (pathogen) damage.

- Expected levels of primary growth or seasonal extension and internodal growth evident for the species.
- No evidence of colonising saprophytes and no deadwood evident.

Good

- Visually complete crown, varying in foliage density throughout.
- Leaf size and colour that is true to type for the species with none or minor levels of pest (insect) and/or disease (pathogen) damage evident.
- Expected levels of primary growth or seasonal extension and internodal growth evident for the species.
- No evidence of colonising saprophytes and low levels of deadwood present and approximately 10mm or less in size.

Fair

- Sparse crown, varying in foliage density throughout.
- Reduced leaf size and atypical in colour for the species.
- Low to medium levels of pest (insect) and/or disease (pathogen) damage.
- Reduced, seasonal extension and internodal growth.
- Deadwood easily visible and less than approximately 30mm in size.
- Epicormic growth may be evident.

Poor

- Obvious signs of crown decline, exhibiting significant reduction in live crown volume and foliage density with reduced leaf size and atypical in colour for the species.
- Evidence of defoliation and/or dieback of branch tips.
- Medium to high levels of pest (insect) and disease (pathogen) damage.
- Presence of exudates (kino and resins) from wounds (open and/or weeping).
- Significant reduction in seasonal extension and internodal growth, with significant levels of epicormic growth evident.
- Deadwood easily visible, approximately 30mm to 100mm in size.

Dead

- No evidence of live foliage observed throughout the crown.
- Obvious signs of cracking and shrinking wood.
- Visible evidence of delaminating bark to stems and branches.

Structure Condition

Very Good

- Strong branch unions at attachment points with no acute angles (compression and tension forks) and good branch taper at unions.
- No visibly, defective tree parts or structural defects.
- No wounds to stems and branches, no crossing and rubbing of branches and no wounds to exposed roots.
- No fungal fruiting bodies present to stems, branches and roots indicating, a presence of fungal pathogens.

Good to Fair

- Developing inclusions at unions of leading, codominant stems and branches.
- Evidence of defective tree parts (low levels) including branch and stem inclusions and crossing and rubbing of branches.
- Evidence of mechanical damage to periderm of stems, branches and roots, exposing vascular tissues.
- Exposed wounds for surface, colonising pathogens and entry points for developing decay.
- Presence of fungal fruiting bodies.
- Some evidence of cavities or hollows. (Fair only)
- No evidence of soil upheaval surrounding base of tree.

Poor

- Obvious signs and evidence of included bark to basal unions of codominant, leading stems and branches.
- Advanced, structural defects evident with failure of tree parts determined within 5 years from time of inspection and assessment.
- Evidence of decay from open wounds with presence of exudates (kino and resins) and exposed and degraded woody tissues.
- Presence of fungal fruiting bodies.
- Presence of cavities and hollows.
- Evidence of mechanical damage with advanced degradation of exposed roots.

a) Hazardous Tree**b) Immediate Removal**

- Advanced, structural defects evident. Open cracks to codominant stem and branch unions evident.
- Previous branch and stem failures evident. Failure of remaining tree parts determined within 3 months 6 months, from time of inspection and assessment. Arboricultural works to be scheduled immediately to mitigate associated hazard and risk.
- Severed roots and soil upheaval evident indicating failure of root zone.
- Tree failure imminent within 12 months from time of inspection and assessment

Landscape Significance

Assesses a tree within the landscape and rates according to criteria taken from Morton (2006):

1. Significant

- The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance; or
- The subject tree forms part of the curtilage of a Heritage Item (building / structure / artifact as defined under the LEP) and has a known or documented association with that item; or
- The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event; or

- The subject tree is scheduled as a Threatened Species or is a key indicator species of an Endangered Ecological Community as defined under the or Biodiversity Conservation Act 2016 (NSW) or The Environmental Protection and Biodiversity Conservation Act 1999 (Federal); or
- The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species; or
- The subject tree is a Remnant Tree, being a tree in existence prior to development of the area; or
- The subject tree has a very large live crown size exceeding 300m² with normal to dense foliage cover, is located in a visually prominent in the landscape, exhibits very good form and habit typical of the species and makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity; or
- The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.

2. Very high

- The tree has a strong historical association with a heritage item (building/structure/artifact/garden etc) within or adjacent the property and/or
- Exemplifies a particular era or style of landscape design associated with the original development of the site; or
- The subject tree is listed on Council's Significant Tree Register; or
- The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link/ Wildlife Corridor or has known wildlife habitat value;
- The subject tree has a very large live crown size exceeding 200m²; a crown density exceeding 70% Crown Cover (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area.

3. High

- The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence; or
- The tree is a locally-indigenous species and representative of the original vegetation of the area; or
- The subject tree has a large live crown size exceeding 100m²; and
- The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (eg crown distortion/suppression) with a crown density of at least 70% Crown Cover (normal); and
- The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area.

4. Moderate

- The subject tree has a medium live crown size exceeding 40m²; and
- The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crown density of more than 50% Crown Cover (thinning to normal); and
- The tree makes a fair contribution to the visual character and amenity of the area; and

- The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms.
- The tree has no known or suspected historical association

5. Low

- The subject tree has a small live crown size of less than 40m² and can be replaced within the short term with new tree planting; or
- The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% Crown Cover (sparse); and
- The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area.

6. Very low

- The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or a nuisance species.
- The subject tree is scheduled as exempt (not protected) under the provisions of the local Council's Tree Preservation Order due to its species, nuisance or position relative to buildings or other structures.

7. Insignificant

- The tree is a declared Noxious Weed under the Noxious Weeds Act (NSW) 1993 or identified as a priority weed within the local region.

Appendix C – Site Photographs



Plate 1: Tree HBT 4, showing a high amount of decay through the central column.

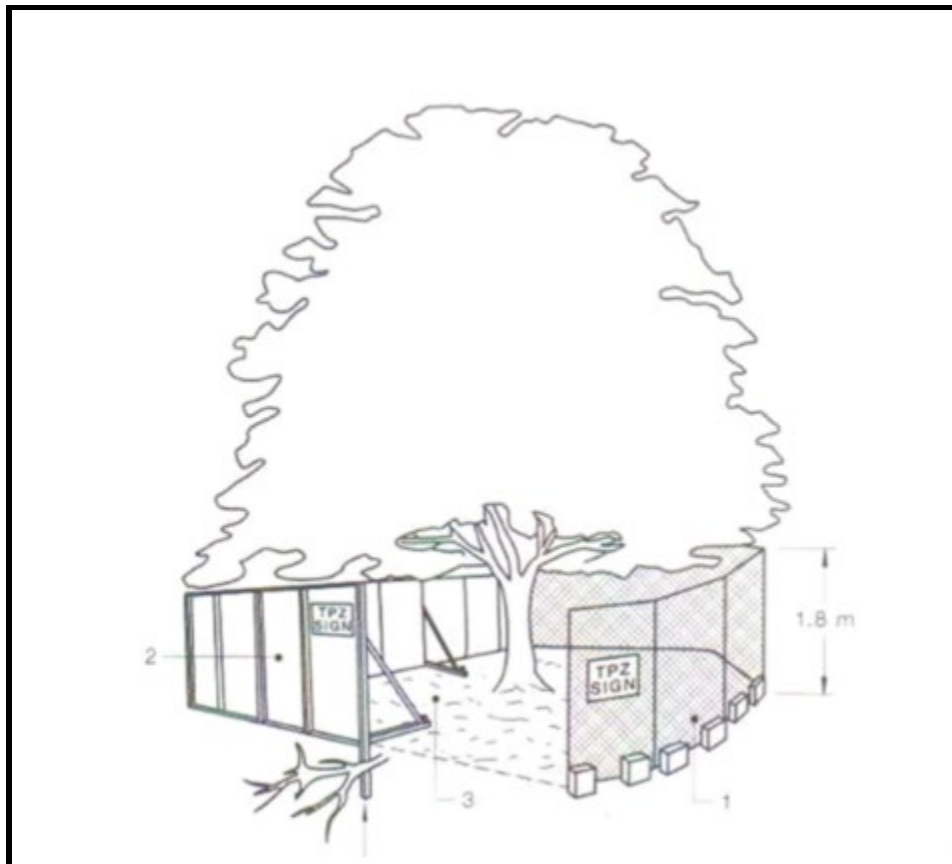


Plate 2: Tree HBT 18, stag tree showing a hazardous lean.

Appendix D - Tree Protection Fencing

Example of tree protection fencing:

1. Fence off all trees noted for retention with 1.8m steel mesh fencing at the perimeter of the designated protection zone. Attach signs relating to the importance of tree protection and penalties for breaching tree protection orders to the fencing. If the area is large, install multiple signs.
2. Signs should state that this is a restricted area, no entry unless in the company of the arborist. Authorised access to the protected zone could be through a locked gate or via ladders
3. Mulching and semi-regular watering for established protection zones.



Appendix E – Port Stephens Council Technical Specification Vegetation 2014

Clause	Requirement	Assessment
4.2	Vegetation Analysis Plan	
	A Vegetation Analysis Plan, which describes the existing vegetation including location on a plan. The vegetation analysis plan will include:	
	A map with a scale of 1:100 for sites up to 1 hectare and 10 metre intervals and a scale of 1:200 for sites of more than 1 hectare.	Refer Figure 1.
	The area to be cleared in square metres and or number of trees to be removed is to be depicted on a map	Figure 3 of BVMP.
	Existing vegetation will be clearly shown and labelled. All vegetation communities identified will be consistent with Lower Hunter Regional Environment Management Strategy or subsequent revisions.	Refer Figure 2.
	Vulnerable Ecological Communities, known vegetation corridors, and wetlands are to be mapped and depicted	Refer Figure 2.
	Groups of trees and vegetation communities within 20 metres of the site boundaries and the location of trees whose canopy overhang the site boundaries	Figure 3 of BVMP.
	Trees and vegetation to be retained, including the purposes of such retention such as natural open spaces, buffer and exclusion zones, vegetation corridors, filter vegetation, protection and or riparian strips.	Refer Figure 3
	Trees with corresponding numbers for the tree assessment schedule	Refer Appendix E and Figure 3 of BVMP.
	Details for protecting remnant trees and vegetation from damage during clearing works construction and on completion. This should include site preparation and location of protective fences. All information must be in accordance with Australian Standards 4970 Protection Of Tree On Development Site 2009.	Refer Appendix E and Section 5.
	Details and locations of Asset Protection Zones.	Refer to Figure 3.
	The rationale for land clearing – For what purpose is the cleared land to be used for.	Refer Section 2 and 3
	Details of the site Layout (Concept Plan) including location of future buildings, storage areas, drainage controls, pollution controls and surface treatments infrastructure and internal fences.	Refer Figure 2
	Where a Tree Assessment Schedule is required by Council it must be prepared by a suitable qualified person and display the following: • Tree number • Scientific name • Common name • Useful Life Expectancy (ULE) values • Age class • Significance • Comments • Habitat Tree Hollow Assessment • Recommendation	Refer Appendix E
	The mapped vegetation data from the Vegetation Analysis Plan is to be provided to Port Stephens Council in an electronic format compatible with Councils GIS system and include a license for its future use.	Mapping data package
4.3	Clearing Considerations	

Clause	Requirement	Assessment
	Council will not permit any clearing to be considered to be carried out as an activity in itself for an unspecified end-use. Clearing will only be allowed where it is necessary to enable a land use permitted on the land.	Section 3.3 and 3.4.
	In assessing applications involving the clearing of land Council will consider the following matters	
	The objectives of the land use zone(s) applying to the land.	The development has been approved by PSC.
	Whether any specimen present is listed in Council's Significant Tree Register. If so, what measures are needed for their conservation, including on-site protection and or removal during and after construction and/or the taking of plant material for propagation.	N/A
	Consistency in relation to Port Stephens Comprehensive Koala Plan of Management.	Section 4.3 and Section 5
	The condition, maturity and useful life expectancy of remnant trees and native vegetation to be retained.	Refer Appendix E for HBTs.
	Impacts on the scenic and visual amenity.	The development has been approved by PSC.
	Effects on natural ecosystems, fauna, fauna habitats and whether fauna needs protection or, if appropriate, relocation. An Assessment of Significance under section 5A of the EP&A Act may be requested.	The development has been approved by PSC.
	The need for bushfire hazard reduction and the effects of this on remaining vegetation. This includes hazard reduction on adjoining land.	The development has been approved by PSC.
	Whether permanent mitigation measures (such as bund walls, catch drains, swales and settling ponds) to contain nutrient and sediment flows and minimise weed dispersal need to be installed eg. in non-urban zones or on sites adjoining remnant bushland or semi-natural open spaces.	The development has been approved by PSC.
	Whether the proposed means of clearing is appropriate with respect to soil type, species of understorey or tree to be retained.	The development has been approved by PSC.
	The adequacy and appropriateness of erosion and sediment controls during and after construction. In this regard, turf grasses are generally unsuitable in conservation zones particularly along or near watercourses and remnant bushland.	The development has been approved by PSC.
	Edge effects on neighbouring vegetation, including, but not limited to, light wash.	The development has been approved by PSC.
	Impacts on wildlife corridors	The development has been approved by PSC.
	Any relevant Key Threatening Processes as listed under the Threatened Species Conservation Act 1995.	The development has been approved by PSC.
	The suitability of any submitted Vegetation Management Plan.	Refer to this report.
	The need to retain vegetation by providing: • Buffer zones as screening to roads or for the protection of identified core habitats, koala habitat buffer area, wetlands, littoral rainforests; • Filter and protection strips to natural drainage lines, watercourses, streams, foreshores of constructed drainage corridors; • Riparian habitat strips; • Exclusion zones for preserving vulnerable and/or significant remnant vegetation and species.	The development has been approved by PSC.
	The need to install temporary tree/vegetation protection measures prior to clearing works.	Section 5 and Appendix E.

Clause	Requirement	Assessment
	Whether the proposed method for the disposing of cleared material is appropriate. All millable timber should be retrieved. Recycling of waste vegetation as chip or grinding is mandatory. The use of woodchip, topsoil and tub grindings for on site mulching or seedbank regeneration is preferred.	The development has been approved by PSC.
	The need for periodic or full time supervision of clearing works to protect environmental values.	The development has been approved by PSC.
	The need to rehabilitate any tree or vegetation adversely affected by clearing or construction works.	The development has been approved by PSC.
	The need to select and plant new trees as replacement for trees cleared.	The development has been approved by PSC.
	The effect of the development on the viability and quality of the bushland and, in particular, the likelihood of soil erosion, siltation of streams, wetlands and other waterbodies, direct or indirect alteration to drainage patterns and to regimes, the spread of weeds, undesirable and exotic species in the bushland, rubbish dumping and incursion by domestic or feral animals.	The development has been approved by PSC.
	The effectiveness of measures proposed to mitigate any identified adverse impacts.	The development has been approved by PSC.
	Any comment made by a public authority	The development has been approved by PSC.
	Whether the vegetation is affected by the provisions of any other Act, Regulation or State Environmental Planning Policy applying to the land.	The development has been approved by PSC.
	Whether the trees or vegetation is a significant component of the habitat of a species listed in schedule 1 or 2 of the Threatened Species Conservation Act 1995 and whether there is a need to assess the significance of the works in accordance with section 5A of the Environmental Planning and Assessment Act 1979.	The development has been approved by PSC.
	Whether the vegetation plan has been prepared by a suitably qualified person.	The development has been approved by PSC.
4.4	Clearing Protocols	Section 5
	Clearing protocols apply to all works which involve the removal of native vegetation in the Port Stephens Local Government Area.	Section 5
	The clearing of native vegetation on site shall not occur within key breeding periods of species identified on site.	Section 5
	Felling techniques are to be sensitive to arboreal mammals and bird species identified on site. Sectional dismantling will be an option where habitat hollows are to reused.	Section 5
	The identification and marking of all habitat trees on site prior to removal.	Appendix E, Section 5
	The underscrubbing of vegetation less than 3m in height will occur prior to tree removal	Section 5
	The retention of habitat trees for a period of 3 nights after the removal of non habitat trees have been felled.	Section 5
	Clearing must then be carried out moving from the fringe of the habitat trees towards the surrounding vegetation.	Section 5
	Trees should be 'soft felled' and inspected immediately by a licensed wildlife carers or Project Ecologist	Section 5

Clause	Requirement	Assessment
	The removal of hollows/nesting sites from felled trees and the re-establishment as per the Port Stephens Council Nest Box Technical Specification.	Section 5
	The felling of trees away from any joining retained habitats.	Section 5
4.5	Clearing Method Statement	N/A
	Where a Clearing Method Statement (CMS) is requested this will include details on:	N/A
	Size and type of any machinery to be used	N/A
	Under scrubbing – this work should be carried out to minimise the establishment of degradation processes and leave a layer of mulch to aid in soil retention in the event of adverse weather	N/A
	Disposal - Proposed means for disposal of cleared materials in this regard the sale of millable timber, chipping or tub grinding of plant materials for reuse on site as mulch to rehabilitate retained.	N/A
	Millable timber - Proposed means of timber to be jinked offsite and any certification required.	N/A
	Timing of proposed works – Works will not occur during key breeding season of fauna species identified on site	Section 5
	Transplanting and the rescue of appropriate species	N/A
	Seed bank should be utilised to revegetate on and off site	N/A
	Habitat Tree Hollow Assessment – compliant with the Port Stephens Council Nest Box Technical Specification	Section 5
	Staggered clearing	Section 5
	Personnel - Prior and during the removal of habitat trees, licensed wildlife carers or consultants shall be employed on site by the proponent to undertake the removal and relocation of fauna species	Section 5
4.6	Vegetation Offsets	N/A
	This section sets out guidelines for Offsets when required or are proposed as a mitigation measure for development impacting upon species and their habitats. This section applies to all development in the Port Stephens Local Government Area.	N/A
	The following guidelines and information:	N/A
	Provides a council standard for offset assessment and calculation when proposed as a mitigation measure for development.	N/A
	Ensures that habitat and species offsets are commensurate with the habitat and species loss.	N/A

Clause	Requirement	Assessment
	Provides a consistent approach for determining offset requirements on a development site in order to offset its impacts.	N/A
	Where offsets are proposed or required:	N/A
	The offset assessment must be carried out by a qualified ecologist.	N/A
	The assessment of the impacted lands must be carried out using Biobanking Assessment Methodology prepared by the Department of Environment and Climate Change, July 2008, or subsequent revisions or alternately seek to meet the offsetting principles identified in the 'Principles for the Use of Biodiversity Offset in NSW' document which is part of the 'Guidelines for Biodiversity Certification of Environmental Planning Instruments'.	N/A
	Calculations of Offsets must be carried out in accordance with Biobanking Assessment Methodology prepared by the Department of Environment and Climate Change, July 2008 or subsequent revisions or alternately seek to meet the offsetting principles identified in the 'Principles for the Use of Biodiversity Offset in NSW' document which is part of the 'Guidelines for Biodiversity Certification of Environmental Planning Instruments'.	N/A
	The applicant must demonstrate an effort to obtain like for like offset lands. In the occasion that like for like offsets cannot be achieved non like for like offsets will be assessed by Council on its individual merit.	N/A
	Where possible offset lands should be located adjacent to NSW National Parks in the Local Government Area.	N/A
	Offset lands adjacent to National Parks should be offered as a dedication to the National Parks and Wildlife Service NSW.	N/A
	Where offset lands adjacent to National Parks are not possible, or the land is not accepted by the National Parks and Wildlife Service NSW a management plan detailing the conservation mechanisms for long term care of the land must be developed. Conservation methods may be in the form of a Voluntary Planning Agreement, formal Bio banking legislation agreements, Voluntary Conservation Agreements, Property Vegetation Plans etc.	N/A
5.1	Monitoring observations will be recorded in a report format and submitted in digital format. The report should include details and evidence of actions.	N/A

Appendix F – CVs

The fieldwork and data analysis for the BVMP was undertaken by:

Staff	Title/Qualification	Tasks
Natalie Black	Senior Environmental Manager BSc (Hons), Master Planning, Cert IV (TA) BAAS: 19076	Report Review
Sarah Currie	Ecologist Bachelor EnvSc Management	Field survey, habitat assessment, Mapping, Report Author