
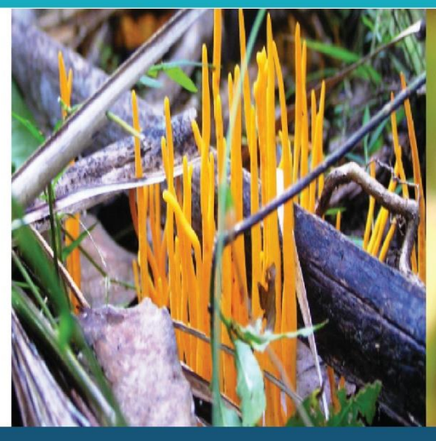

TRAVERS BUSHFIRE & ECOLOGY

A TBE ENVIRONMENTAL COMPANY

# VEGETATION MANAGEMENT PLAN - WEST PENNANT HILLS

Proposed Rezoning

Part Lot 5, 6, 7, 15, 16 and 17 DP 11133

87-97 Castle Hill Road, and 121-131 Oratava Avenue,

West Pennant Hills

24 May 2024

(REF: MEC03INT)

# VEGETATION MANAGEMENT PLAN

**Part Lot 5, 6, 7, 15, 16 and 17 DP 11133, 87-97 Castle Hills Road and 121-131 Oratava Avenue, West Pennant Hills**

**Prepared for:** **Mecone on behalf of Forestry Corporation of New South Wales**
**Prepared by:** **Travers bushfire & ecology**
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**Approved by** **Lindsay Holmes (B. Sc.) - Principal Ecologist – BAM accredited assessor**

**Date:** **24 May 2024**

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**Figure 1 – Proposed VMP area (Yellow)**

Travers bushfire & ecology has been engaged to undertake a biodiversity development assessment within Part Lot 4, 5, 6, 7, 15, 16 and 17 DP 11133, at 87-97 Castle Hill Road, and 121-131 Oratava Avenue, West Pennant Hills within The Hills Shire Council local government area (LGA).

A rezoning review application (RR-2024-1 – The Hills LGA – PP-2023-2300) was submitted in February 2024 seeking to amend The Hills Local Environmental Plan (LEP) 2019 on land at 87-97 Castle Hill Road & 121-131 Oratava Avenue, West Pennant Hills to:

- Rezone the sites from RU3 Forestry to R2 Low Density Residential;
- Introduce a maximum building height of 9m; and
- Amend the minimum lot size from 40 ha to 1,140m$^2$ for the northern area, and 1,700m$^2$ for the southern area.

The Strategic Planning Panel of the Sydney Central City Planning Panel determined that the proposal should proceed to Gateway determination because the proposal has demonstrated strategic merit and subject to changes site specific merit. In making this decision, the Panel considered the request and advice provided by Council, the proponent and the Department of Planning, Housing and Infrastructure.

The Panel recommended that prior to the planning proposal being submitted for a Gateway determination, it is to be revised to address the following:

- Amend the minimum lot size to 1,140m$^2$ for the Northern site and 1,700m$^2$ for the Southern site; and
- Update the Biodiversity Development Assessment Report, arborist report and **vegetation management plan**.

This report is being prepared to address the above recommendations.

## VEGETATION MANAGEMENT AIMS

The purpose of this Vegetation Management Plan (VMP) is to define and document the actions required to protect ecological features within the development footprint of the proposed rezoning sites.

The northern site (off Castle Hill Road) contains Plant Community Type (PCT) 3136 - Blue Gum High Forest (BGHF) and the southern site (Oratava Avenue) contains PCT 3262 - Sydney Turpentine Ironbark Forest. Both communities are listed as a Critically Endangered Ecological Community (CEEC) under the NSW *Biodiversity Conservation Act* (2016) and also within the Commonwealth *EPBC Act* (1999).

The aims of this VMP include:

- Installation of protective fencing around the APZ, trees being retained and erosion control fencing.
- Implement protocols for tree hollow felling and fauna handling procedures.
- Implement protocols for minimising the spread of fungal-borne diseases.
- Implement weed control over a period of 5 years minimum.
- Manage remnant bushland to inner protection area standards of an asset protection zone (APZ).
- Provide guidelines for landscaping works to compliment the surrounding environment.
- Provide habitat augmentation through log enrichment and nest boxes (or salvaged hollows).
- Engagement of an independent project ecologist to undertaken ongoing monitoring, compliance inspections and certifications.
- Engagement of a suitably qualified bushland regeneration team.
- Provide performance targets for measures of compliance against the VMP aims.

## BEST PRACTICE MANAGEMENT GUIDELINES

This VMP has been prepared taking into the principles and typical approaches as described in:

- Saving our Species – Help to save the Blue Gum High Forest in the Sydney Basin Bioregion; Link: *Saving Our Species - Blue Gum High Forest*
- *Best Practice Guidelines Blue Gum High Forest* (DECC 2008)
- *Best Practice Guidelines Sydney Turpentine-Ironbark Forest* (DECC 2008)

## SITE PREPARATION & PROTECTION OF NATIVE VEGETATION

The following site preparation must be undertaken:

- Install temporary tree protection fencing during construction for all **native remnant** trees to be retained, bordering the proposed development (specific trees assessed by the arborist are shown on Schedule 1). Smaller trees not assessed by the arborist should be fenced temporarily as well to 3m from the trunk to assure than all trees with a trunk up to 25cm diameter at breast height is adequately protected. The project arborist should provide specific advice on tree protection measures.
- Installation of permanent protective fencing on the APZ edge with locked access gates to prevent public access and limit domestic animals entering the site as shown in Schedule 1. It is assumed that Colorbond fencing or similar will be used on the site's perimeter that adjoins the Cumberland State Forest, but internal fencing to demarcate the APZ should be ringlock or chainlink fencing (or fencing as agreed to with the project ecologist) similar to that shown on Figure 3.
- Sediment fencing is to be installed immediately adjacent or in conjunction with the permanent protection fencing on the lower side of the development area where vegetation is being removed at least 1 week prior to the clearing / construction zone, for the duration of the construction period in compliance with *Soils & construction Managing Urban Stormwater* (Landcom 2004).
- Commence weed control within the APZ area once fencing has been installed to target high threat exotic species and those listed in the *Biosecurity Act* (2015) as a first priority. Removal of species such as *Celtis sinensis, Ligustrum lucidum, Ligustrum sinense* and *Lantana camara* will greatly reduce fuel load levels in the APZ and assist in creating the required sub-canopy separation.
- Follow-up weed control should focus on the removal of seedlings of exotic trees and shrubs, control of vines and exotic groundcovers to encourage natural regeneration of native grasses and forbs of STIF and BGHF origin.
- No mulching is to occur as this will prevent native BGHF and STIF seed retained in the soil from germinating (DECC 2008).
- All litter and any other waste material on site is to be removed prior to restoration works in the VMP. Ongoing rubbish removal throughout the maintenance period is to be undertaken.

## TREE PROTECTION

A project arborist is to be appointed to mark trees being retained on the construction footprint edge, advise the location of temporary tree protection fencing, supervise and sign off (compliance certificate) that the installation has been adequately undertaken, and to supervise during the vegetation clearing works. The project arborist along with the site manager will be responsible for marking trees for retention and ensuring tree protection measures including fencing are put in place prior to any clearing.

## FENCING AND SIGNAGE

Permanent protective fencing of 1.2m high black ringlock or chainlink fence with either timber or steel posts and rail is to be installed (Figure 2) to demarcate the APZ and vegetation retention area. This fence is to remain in perpetuity to limit domestic pets such as dogs from entering the site. No barbed wire fencing is to be used.

**Figure 2 – Fencing example**

## REVEGETATION SPECIFICATIONS

As the APZ requires ongoing managed to ensure fuel loads are not exceeding inner protection standards, no revegetation specifications are being set for the planting of shrubs and trees.

Planting of material in the APZ is only to be undertaken where there are areas of bare soil to create a native groundcover that will assist in minimising erosion risk. For this project, this will only occur in the northern site (Castle Hill Road) where remnant vegetation is dominant over sloping land. The southern site (Oratava Avenue) has a full groundcover currently. The northern site contains BGHF so only species relative to the Scientific Committee's final determinations may be planted. Native species not listed in the final determinations are not to be used as they may become a dominant feature and spread into the adjoining Cumberland State Forest.

Table 1 provides a recommended revegetation species list for groundcovers only. Any variation from Table 1 must be approved by the project ecologist. All plant stock selected for restoration are to be sourced from the local area, preferably within the Hills Shire LGA. A minimum of 10 native species shall be used as part of the BGHF revegetation works.

Planting works are to be undertaken preferably in March / April or September / October to avoid mid-summer heat, and potential frosts that are experienced in and around winter on occasion.

As a minimum, holes for tree planting are to be twice the depth and twice the width of the pot size of the plant.

Revegetation Maintenance

All installed plantings are to be protected with a 2L cardboard box or corflute guards with small supporting stakes to protect them from frost and grazing animals such as rabbits if required. Baiting is not to be undertaken as part of the VMP works due to potential impacts on pets, and the areas adjacent being used for recreation.

Weed control works, bush regeneration and restoration are to be undertaken over a minimum maintenance period of five (5) years which begins at the end of the construction phase. Weed control and restoration works are to be monitored and audited by an appointed project ecologist over 5 years to achieve the restoration performance targets, with annual compliance certificates to be issued to Council describing the works undertaken, and adherence to the performance measures.

It is expected that at least 90% of plantings will survive and will be progressively replaced if any plants are observed to die or be destroyed. If the success rate is less than 90%, contingency planting is to be undertaken to re-establish the performance targets required.

### PCT 3136, BGHF groundcover planting

The site in its current condition, on average has approximately 65% vegetation cover in the ground layer strata. The APZ are includes a combination of PCT 3136 moderate-good, PCT 3136 managed and planted native vegetation, as well as a cleared area of approximately 0.01 ha and a total area of approximately 0.14 ha.

On the basis that 2/3 of the area, or 466m$^2$ is to be planted, at 3 plants per m$^2$, the total estimated planting is equivalent to 1,400 groundcovers.

## NON-CONFORMANCE WITH VMP

Contingency restoration works may also include:

- Additional target weed control to reach the target weed coverage
- Additional enrichment plantings to rectify areas of low diversity or cover
- Rectification of fencing
- Removal of waste or soil
- Removal of litter
- Replacement nest boxes
- Rectify damage to roots of trees; and
- Sediment and erosion control.

## PROJECT MANAGEMENT, REPORTING AND AUDITING

The following project management tasks are to be undertaken:

1. Engagement of qualified and experienced bushland regeneration contractors to undertake all restoration works (Supervisor - *Certificate III/IV in Conservation and Land Management* or equivalent, with at least three (3) years of field experience);
2. All plant stock is to be certified as local provenance from the supplier, with preference for seeds collected from similar community types within the locality;
3. Engagement of an independent project ecologist to undertake auditing, reporting and compliance certification;
4. Photo points and monitoring quadrats are to be set up prior to contract work to establish a baseline and these are to be monitored at least annually for 5 years; and
5. A compliance statement is to be submitted to Council upon completion of the revegetation works (practical completion) and at the end of each year for the 5-year maintenance period assessing compliance with the stipulated restoration performance targets.

## RESTORATION PERFORMANCE TARGETS

The following restoration performance targets are to be audited and compliance certificate issued by the project ecologist demonstrating satisfactory completion of the works in accordance with the VMP and as shown on Schedule 1.

1. Install a 1.2m high permanent ringlock or chainlink protective fence with metal posts and railing is to be around the construction footprint as shown in Schedule 1.
2. Final weed coverage will not exceed more than 15% coverage in any structural layer at the end of Year 1 and less than 5% at the end of Year 5, with no more than 1% comprising high threat exotics or species listed under the *Biosecurity Act*.
3. 1,400 groundcovers to be planted, with a species mix comprising 10 species or more, and a survival rate of at least 90%. Plantings are to be protected with cardboard boxes or similar for at least the first year.
4. As vegetation on site is cleared, logs are to be stockpiled for future use within the restoration area. A minimum of 50m of logs (minimum 3m long and 10cm width or greater) are to be placed within the APZ for ground refuge.
5. Four (4) nest boxes/salvaged hollows installed to provide habitat for hollow-dependent fauna.
6. All preconstruction tasks such as temporary fencing, erosion control, marking of retained trees on the edge of the protection area, arborist supervision of clearing, and project ecologist supervision of hollow dismantling is to be signed off with a compliance certificate.
7. APZ monitoring is to comply with inner protection area standards, reviewed annually for the duration of the VMP.
8. Mitigation measures for pathogen control are to be adhered to and monitored.
9. Displaced fauna (if found), are to treated in accordance with the guidelines of this VMP.
10. Where annual compliance is not achieved, the project ecologist shall advise of the supplementary works required.

## ONSITE VEGETATION & CONDITION

The following vegetation communities were identified within the study area through ground truthing. Threatened ecological communities are denoted with 'TEC'.

- PCT 3136 – Blue Gum High Forest - TEC
- PCT 3262 – Sydney Turpentine Ironbark Forest – TEC
- Planted native vegetation

**PCT 3136 – Blue Gum High Forest**

This vegetation community is located in the northern and southern study areas but restricted more closely to the riparian line in the southern study area outside of the development footprint.

Canopy – *Eucalyptus saligna, Syncarpia glomulifera, Angophora floribunda* and *Eucalyptus pilularis* are the most dominant canopy species to a height of 20–40 m tall. The projected foliage cover (PFC) averages approximately 30–50%.

Mid-storey – *Pittosporum undulatum, Acacia implexa, Polyscias sambucifolia, Trema tomentosa, Brachychiton acerifolius, Allocasuarina torulosa, Alphitonia excelsa, Pittosporum revolutum, Glochidion ferdinandi, Acacia decurrens* and *Ficus coronata* with a height generally below 12 m and a highly variable PFC dependent upon the level of disturbance. Exotic species were very frequent within the northern study area which included species such as *Celtis sinensis, Cinnamomum camphora, Ligustrum sinense* and *Ligustrum lucidum.*

Ground layer and vines – *Pteridium esculentum, Clematis aristata, Eustrephus latifolius, Morinda jasminoides, Entolasia marginata, Pandorea pandorana, Calochlaena dubia, Pellaea falcata, Cayratia clematidea, Commelina cyanea, Dianella caerulea, Entolasia stricta, Blechnum cartilagineum, Plectranthus parviflorus, Stephania japonica, Dichondra repens, Doodia aspera, Microlaena stipoides, Oplismenus imbecillis* and *Lobelia purpurascens.*


***Photo 1 – Moderate-good PCT 3136***


***Photo 2 – Managed understorey PCT 3136***

**PCT 3262 - Sydney Turpentine Ironbark Forest**

The community is located in the southern study area as a managed and modified vegetation type with a mixture of native and planted trees, cleared patches and impacted ground layer (weeds and lawn).

Canopy – *Eucalyptus saligna,* and *Eucalyptus pilularis* with planted *Eucalyptus microcorys* and other Eucalypts to a height of 20–33 m. The PFC averages approximately 10–20% due to previous clearing and disturbances.

Mid-storey – There is an irregular mid-storey containing *Pittosporum undulatum, Bursaria spinosa, Melia azedarach, Acacia implexa, Allocasuarina torulosa* and *Acacia parramattensis.* There are other planted shrubs such as *Callistemon viminalis, Syzygium* spp. and *Murraya paniculata* that make up the mid-storey. The PFC for native species is less than 10%.

Ground layer – *Microlaena stipoides, Wahlenbergia gracilis, Pandorea pandorana, Eragrostis brownii, Dichondra repens, Cayratia clematidea, Veronica plebeia, Clematis aristata, Oplismenus aemulus, Desmodium varians, Glycine clandestina, Commelina cyanea, Leucopogon juniperinus, Oplismenus imbecillis, Lobelia purpurascens, Dichondra repens, Lomandra longifolia, Echinopogon caespitosis* and *Eustrephus latifolius.*


***Photo 3 – Managed STIF vegetation with occasional tree planting and full ground layer***

**Planted Native Vegetation**

This describes the northern portion of the northern study area and is comprised of planted native vegetation.

Canopy - *Eucalyptus grandis, Corymbia tessellaris* and *Corymbia maculata* providing 50% PFC.

Mid-storey - *Leptospermum petersonii, Callistemon salignus, Lophostemon confertus, Backhousia citriodora, Syzygium* spp., *Melia azedarach, Clematis aristata* and *Alectryon subcinereus* provide 20–30% PFC. Exotic species are present in low abundance.

Ground layer – *Oplismenus aemulus, Dichondra repens, Cyperus gracilis, Microlaena stipoides,* and *Veronica plebeia* provide 11% PFC.

The southern portion of the southern study area is comprised of planted native and non-native vegetation.

Canopy – *Eucalyptus scoparia, Pinus radiata, Corymbia tessellaris Araucaria bidwillii, Eucalyptus microcorys* and *Corymbia citriodora,* 12-24m tall and 15-20% PFC.

Mid-storey – *Syzygium paniculatum* and landscaping species in gardens, otherwise absent.

Ground layer – Largely exotic with a very low proportion of *Dichondra repens, Microlaena stipodes, Veronica plebeia* and *Lobelia purpurascens.*

***Photo 4 – Planted native vegetation along the norther boundary adjacent to Castle Hill Road***

# RESTORATION SPECIES LIST

***Table 1 – Revegetation Species for Planting PCT 3136 – Blue Gum High Forest***

| Scientific name | Common name | No. of plants |
|---|---|---|
| **Groundcover Planting** | | **3 per 1m² = 1,400** |
| Grasses and grass-like species | | 700 (50%) |
| *Entolasia marginata / stricta* | Bordered Panic | 250 |
| *Lomandra longifolia* | Spiny-headed Mat-rush | 100 |
| *Oplismenus aemulus / Oplismenus imbecillis* | Basket Grass | 250 |
| *Poa affinis* | Bluegrass | 100 |
| Forbs / Ferns | | 600 (43%) |
| *Dianella caerulea* | Blue Flax-lily | 100 |
| *Doodia aspera / Calochlaena dubia / Aspelenium flabellifolium / Pteridium esculentum* | n/a (Various fern species) | 200 |
| *Lobelia purpurascens* | White Root | 100 |
| *Pseuderanthemum variabile* | Pastel Flower | 100 |
| *Viola hederacea* | Native Violet | 100 |
| **Climber Planting** | | 100 (7%) |
| *Clematis aristata* | Old Man's Beard | 25 |
| *Eustrephus latifolius* | Wombat Berry | 25 |
| *Pandorea pandorana* | Wonga Wonga Vine | 25 |
| *Smilax glyciphylla* | Sarsaparilla | 25 |

The numbers utilised in the table above are indicative and final planting numbers and mix of species sought needs to be approved by the project ecologist.

- Minimum of 10 species to be utilised
- Total number of plants installed to be 1,400
- Minimum survival is 90%.

# THREATENED ECOLOGICAL COMMUNITIES & SPECIES

Ecological survey and assessment has been undertaken in accordance with the *Biodiversity Assessment Methodology* (BAM) as well as relevant legislation including the *EP&A Act* and relating to the species provisions of the *BC Act*.

Threatened Communities

PCT 3136 Blue Gum High Forest was observed onsite as the best fit PCT for the northern site off Castle Hill Road which is representative of NSW *BC Act* (2016) and the Commonwealth *EPBC Act* (1999) listed critically endangered ecological community (CEEC) known as Blue Gum High Forest of the Sydney Basin Bioregion.

***Photo 5 – Typical good condition Blue Gum High Forest***

PCT 3262 Sydney Turpentine-Ironbark Forest was observed onsite as the best fit PCT for the southern site off Oratava Avenue which is representative of NSW *BC Act* (2016) and the Commonwealth *EPBC Act* (1999) listed critically endangered ecological community (CEEC) known as Turpentine Ironbark Forest of the Sydney Basin Bioregion.

***Photo 6 – High quality STIF located in Wallumata Nature Reserve in Sydney***

Threatened Flora and Fauna

The follow threatened species were recorded during surveys between 2018-2024 on or immediate adjacent to the site:

- Powerful Owl (2024)
- Little Lorikeet (2018)
- Gang-gang Cockatoo (2018 & 2019)
- Grey-headed Flying-fox (2018 & 2019)
- Little Bent-winged Bat (2020)
- Large Bent-winged Bat (2020)
- Greater Broad-nosed Bat (2018)
- Dural Land Snail (2024)
- *Eucalyptus scoparia* (planted specimens only)
- *Eucalyptus nicholii* (planted specimens only, as per the Arborist report, although not identified during the botanical survey)
- *Syzygium paniculatum* (planted specimens only)

The identified specimens of *Eucalyptus scoparia, Syzygium paniculatum* and *Eucalyptus nicholii* are all planted and do not constitute an important population of the species. Most specimens occur in the construction footprint and will likely be removed.

Powerful Owl

Powerful Owl – *A breeding pair of Powerful Owl were observed during survey undertakenin 2024 survey.* No Powerful Owl or medium-large hollows suitable for nesting/roosting by these species are present within the development footprint however, the species polygon for Powerful Owl must be drawn to include all vegetation zones; 1. within 800 m (being the approximate home range) from the location of a detected owl, and 2. containing a living or dead tree with a hollow >20cm diameter that occurs >4m above the ground. The proposal does not directly impact any known roosting or breeding hollows for Powerful Owl.

The restoration actions and design specifications of the surrounding landscape are aimed at providing a habitat conducive to the requirements for this species and its prey. Powerful owls forage mainly on medium-sized arboreal marsupials, particularly greater glider, common ringtail possum and sugar glider. It is anticipated ringtail possum and sugar glider would be the main arboreal marsupial prey for local powerful owls. Flying-foxes and birds are also part of their diet when there is lower availability of mammal prey.

As many prey species require hollows and a shrub layer, these are identified as important components for powerful owls (Bionet Wildlife Atlas 2024). Powerful owls themselves nest in large tree hollows (0.5m deep) in large eucalypts (80+ DBH) and nesting occurs from late autumn to mid-winter (May to August). The proposal should avoid the planted Turpentine trees along the eastern boundary of the northern investigation area (separating residences further east) that provide potential Powerful Owl roosting habitat as well as screening of light overflows from the urban landscape. Nonetheless, ongoing monitoring for this Powerful Owl will be conducted as part of this VMP to ensure the preservation of this species within the locality (May-June annually).

Microbats

Recorded threatened microbats included Little and Large Bent-winged Bat, and Greater Broad-nosed Bat. Non-threatened species were recorded also. Many species of microbats utilise hollows for breeding, so it is important that if trees containing hollows are to be removed, protocols for their removal are to be followed.

There are three (3) hollow-bearing trees located within the construction footprint likely to be removed, labelled HT1s, HT1n and HT2n (s – southern lot, n – northern lot).

A precautionary approach will be undertaken to ensure if any roosting habitat is within these trees, the relevant hollow section will be safely recovered and relocated to the APZ. If hollows cannot be salvaged, then they will be replaced with appropriate nest boxes. A minimum of four (4) microbat nest boxes are to be installed to provide additional habitat for any displaced individuals as a result of the development.

Grey-headed Flying-fox (GHFF)

Grey-headed flying-fox were recorded on site during fauna surveys in the past, 2018-2019, however there are no known camps within the site. Therefore, GHFF are considered to only utilise the site as foraging habitat and as such focus has been put on planting native foraging resources. Potential foraging species are proposed for landscaping features post construction.

Dural Land Snail (DLS)

The species was recently identified on site however those specimens occur outside of the development footprint. A search of the construction footprint for alive specimens is to be conducted 1-2 weeks prior to vegetation clearance such that if any specimens are located, they can be moved to adjoining conserved lands.

Gang-gang Cockatoo

An individual Gang-gang Cockatoo was recorded by call during initial botanical surveys in 2018. No hollows within the or close to development footprints were considered suitable for Gang-gang Cockatoo. Potential foraging habitat for the species is to be retained in the APZ.

Threatened Fauna Considerations

Factors to consider include:

- Lighting elements to limit light pollution emanating from adjacent development.
- Installation of nest boxes/salvaged hollows in the restoration area to provide replacement roosting habitat for potentially displaced microbats.
- Installation of nest boxes/salvaged hollows to encourage arboreal mammals and birds, and subsequently prey items for Powerful Owl.

## Light reduction

Artificial light from the proposed development impacts fauna species in terms of behaviour and/or physiology, alter the availability of habitat or food resources and can attract predators and invasive pests. To minimise light pollution from entering conserved bushland, particularly to Powerful Owl foraging, the adjacent development will have building design to limit artificial lighting.

- Window film on buildings will be installed to reduce light export by 75%.
- Light baffles, deflectors and shields are to be used on light sources to direct light away from protected habitat.
- Non-reflective dark-coloured surfaces should be used where possible.
- Access pathways are to use low lumen and restricted height lighting (<0.5m) with directional shields. Light fixtures are to be located as close to the ground as possible and shielded.
- There is to be no use of external lighting on buildings facing the protected restoration area within 10m of the site boundary.

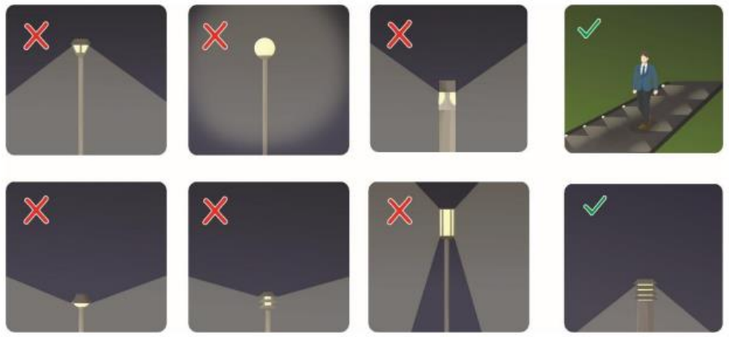

**Figure *3* – Examples of outdoor wildlife friendly lighting for accessways**

(*National Pollution Guidelines for Wildlife - DEE 2020*)

## DOMESTIC PETS

The APZ area will be designed to limit access from domestic animals entering the APZ portion of the site. The area is to have a 1.2m high chainlink or ringlock fence, with locked gates to discourage both the public and domestic animals from disturbing resident native fauna.

## LANDSCAPING IN THE DEVELOPMENT FOOTPRINT

The following table lists selective species for both BGHF and STIF that are recommended for landscaping post construction in the development footprint, ie. Not the APZ. These are chosen to compliment the surrounding landscape and local fauna. Only trees, sub-canopy and shrubs have been specified.

***Table 2 – Suggested landscaping plants***

| Scientific name | Common name | No. of plants |
|---|---|---|
| **Blue Gum High Forest** | | |
| Trees and sub-canopy | | |
| *Clerodendrum tomentosum* | Hairy Clerodendrum | |
| *Brachychiton acerifolius* | Illawarra Flame Tree | |
| *Acacia parramattensis* | Parramatta Wattle | |
| *Acmena smithii* | Lilly Pilly | |
| *Ceratopetalum gummiferum* | Christmas Bush | |
| *Melia azedarach* | White Cedar | |
| Shrubs | | |
| *Polyscias sambucifolia* | Elderberry Panax | |
| *Pittosporum revolutum* | Rough fruit Pittosporum | |
| *Denahmia silvestris* | Narrow-leaved Orangebark | |
| *Leucopogon juniperinus* | Prickly Beard-heath | |
| *Trema tomentosa* var. *aspera* | Native Peach | |
| *Acacia longifolia* | Sydney Golden Wattle | |
| *Indigofera australis* | Australian Indigo | |
| **Sydney Turpentine Ironbark Forest** | | |
| Trees | | |
| *Notelaea longifolia* | Mock Olive | |
| *Acacia parramattensis* | Parramatta Wattle | |
| *Clerodendrum tomentosum* | Hairy Clerodendrum | |
| *Brachychiton acerifolius* | Illawarra Flame Tree | |
| *Acacia decurrens* | Black Wattle | |
| *Melia azedarach* | White Cedar | |
| Shrubs | | |
| *Leucopogon juniperinus* | Prickly Beard-heath | |
| *Polyscias sambucifolia* | Elderberry Panax | |
| *Kunzea ambigua* | Tick Bush | |
| *Acacia floribunda* | White Sally Wattle | |
| *Acacia linifolia* | White Wattle | |
| *Correa reflexa* | Native Fuchsia | |

## WEEDING PRIORITIES

***Table 1 - Weed species identified with the site***

| *Family* | *Scientific name* | *Common name* | *Priority* |
|---|---|---|---|
| **Trees** | | | |
| Aceraceae | *Acer* sp. (cultivar)* | Maple | Medium |
| Ulmaceae | *Celtis sinensis** | Chinese Hackberry | Very High |
| Lauraceae | *Cinnamomum camphora** | Camphor Laurel | Very High |
| Rutaceae | *Citrus sp.** | - | Low |
| Malaceae | *Eriobotrya japonica** | Loquat | Low |
| Oleaceae | *Fraxinus angustifolia** | Claret Ash | Medium |
| Bignoniaceae | *Jacaranda mimosifolia** | Jacaranda | Medium |
| Lythraceae | *Lagerstroemia indica** | Crepe Myrtle | Low |
| Oleaceae | *Ligustrum lucidum** | Large-leaved Privet | Very High |
| Hamamelidaceae | *Liquidambar styraciflua** | Sweet Gum | Very High |
| Pinaceae | *Pinus radiata** | Radiata or Monterey Pine | Low |
| **Shrubs** | | | |
| Fabaceae | *Genista monspessulana** | Montpellier Broom | High |
| Proteaceae | *Grevillea* sp. (cultivar)* | - | Low |
| Malvaceae | *Hibiscus sp.* (cultivar)* | Hibiscus | Low |
| Verbenaceae | *Lantana camara** | Lantana | Very High |
| Myrtaceae | *Leptospermum petersonii** | Lemon Scented Tea-tree | Low |
| Oleaceae | *Ligustrum lucidum** | Large-leaved Privet | Very High |
| Oleaceae | *Ligustrum sinense** | Small-leaved Privet | Very High |
| Araceae | *Monstera deliciosa** | Fruit-salad Plant | Medium |
| Rutaceae | *Murraya paniculata** | Orange Jessamine | Low |
| Berberidaceae | *Nandina domestica** | Sacred Bamboo | Low |
| Ochnaceae | *Ochna serrulata** | Mickey Mouse Plant | High |
| Oleaceae | *Olea europaea* subsp. *cuspidata** | African Olive | Very High |
| Plumbaginaceae | *Plumbago sp.** | - | Medium |
| Malaceae | *Rhaphiolepis indica** | Indian Hawthorn | Low |
| Ericaceae | *Rhododendron* sp. (cultivar)* | Azalea | Low |
| Rosaceae | *Rubus fruticosus* sp. agg.* | Blackberry Complex | Very High |
| Solanaceae | *Solanum mauritianum** | Wild Tobacco | Low |
| **Groundcovers** | | | |
| Asteraceae | *Ageratina adenophora** | Crofton Weed | High |
| Asparagaceae | *Asparagus aethiopicus** | Asparagus Fern | Very High |
| Asparagaceae | *Asparagus plumosus** | | Very High |
| Poaceae | *Axonopus fissifolius** | Narrow-leafed Carpet Grass | High |
| Asteraceae | *Bidens pilosa** | Cobbler's Pegs | Medium |
| Poaceae | *Bromus cartharticus** | Prairie Grass | Medium |
| Poaceae | *Cenchrus clandestinus** | Kikuyu | High |
| Asteraceae | *Conyza bonariensis** | Flaxleaf Fleabane | Medium |
| Asteraceae | *Conyza sumatrensis** | Fleabane | Medium |
| Poaceae | *Digitaria sanguinalis** | Crab Grass | Medium |
| Poaceae | *Ehrharta erecta** | Panic Veldtgrass | High |
| Poaceae | *Eleusine tristachya** | Goose Grass | Medium |
| Poaceae | *Eragrostis curvula** | African Lovegrass | High |
| Euphorbiaceae | *Euphorbia peplus** | Spurge | Low |
| Asteraceae | *Gamochaeta spicata** | Cudweed | Low |
| Asteraceae | *Hypochaeris radicata** | Flatweed | Low |
| Liliaceae | *Lilium formosanum** | Formosan Lily | Medium |
| Fabaceae | *Lotus suaveolens** | Hairy Bird's Foot Trefoil | Low |
| Primulaceae | *Lysimachia arvensis** | Scarlet Pimpernel | Low |
| Malvaceae | *Modiola caroliniana** | Red-flowered Mallow | Low |
| Davalliaceae | *Nephrolepis cordifolia** | Fish-bone Fern | High |
| Oxalidaceae | *Oxalis corniculata** | Yellow Wood Sorrel | Low |
| Poaceae | *Paspalum urvillei** | Vasey Grass | High |
| Plantaginaceae | *Plantago lanceolata** | Ribwort | Low |
| Rubiaceae | *Richardia stellaris** | - | Low |
| Malvaceae | *Sida rhombifolia** | Paddy's Lucerne | Medium |
| Solanaceae | *Solanum nigrum** | Black Nightshade | Medium |
| Solanaceae | *Solanum pseudocapsicum** | - | Medium |
| Poaceae | *Sporobolus africanus** | Parramatta Grass | High |
| Poaceae | *Stenotaphrum secundatum** | Buffalo Grass | High |
| Asteraceae | *Taraxacum officinale** | Dandelion | Low |
| Commelinaceae | *Tradescantia fluminensis** | Wandering Jew | Very High |
| Fabaceae | *Trifolium repens** | White Clover | Medium |
| Agavaceae | *Yucca* sp.* | - | Low |
| **Vines** | | | |
| Apocnyaceae | *Araujia sericifera** | Mothvine | Very High |
| Oleaceae | *Jasminum polyanthum** | Jasmine | High |
| Passifloraceae | *Passiflora edulis** | Common Passionfruit | High |
| Passifloraceae | *Passiflora suberosa** | Cork Passionflower | High |

# WEED CONTROL

Primary (initial) weed control is to be undertaken prior to any site works to remove highly invasive weed propagules and the bulk of exotic ground layer grasses. All ground and shrub layer weed control works are to be undertaken by qualified personnel from an experienced bushland regeneration company utilising low impact and best practice weed control, restoration, revegetation and bush regeneration methods.

In accordance with the *Biosecurity Act 2015*, all pest plants are regulated with a general biosecurity duty to prevent, eliminate or minimize any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practical.

## Priority Weeds

Priority weeds in the Sydney region are specified in the Greater Sydney Regional Strategic Weed Management Plan 2017-2022. Priority weeds that are listed as "State Priority Weeds" and "Regional Priority Weeds" have specific measures for the control of individual weed species no matter the land ownership or location. Weed treatment is to be undertaken across the APZ to progressively remove weeds and to assist with compliance to an inner protection area.

## Fauna Habitat and Weed Control

There is a significant number of exotic species including *Celtis sinsesis, Lantana*, *Ligustrum sp.* (Privet) and *Rubus fruticosus sp. agg.* (Blackberry) within the site. Although these species are generally considered very high priority for removal as stated in Table 3, these weeds currently provide habitat and foraging resources for native fauna. Since there are few native shrubs present on site, the removal of these weedy shrub and sub-canopy species must be completed in a staged manner and by hand, with care taken not to accidentally remove nests in densely vegetated areas.

# RESTORATION MONITORING

Prior to commencement of works a minimum of four (4) photo locations are to be established, GPS recorded and marked with a coloured wooden stake (dumpy peg). Star pickets can be a hazard in the long term and should be avoided. Baseline vegetation condition assessment and regular monitoring reports and photos are to be sent to Council annually for the 5-year maintenance period, confirming compliance with the VMP. The vegetation condition at the time of survey can be viewed in Schedule 1. The monitoring of vegetation within the APZ will be completed through general condition assessment using 10x10m vegetation plots.

Vegetation monitoring plots are to include:

- a species list and approximate coverage of each
- estimate of the exotic weed coverage in each strata

Other monitoring to be undertaken annually:

- a measure of the fuel loads to check for APZ compliance
- annual photos at selected photo points
- review the condition of nest boxes or salvaged hollows that have been re-attached to trees
- groundcover replanting success
- noting any areas of erosion or sediment deposition to be remediated
- temporary and permanent fencing is fit for purpose
- undertake a check for Powerful Owl to see if it's utilising the locality each May-June, or check with Cumberland State Forest staff to confirm

# PATHOGEN CONTROL AND MANAGEMENT

Two types of pathogens are at risk of being introduced to the site and affect the outcomes for restoration works and tree plantings.

- **Root Rot Disease** (*Phytophthora cinnamomic*)
- **Myrtle Rust** *(Puccinia psidii)*

## *Phytophthora cinnamomi*

*Phytophthora cinnamomi* is a soil-borne plant pathogen that attacks the roots of susceptible plants—destroying the root system and reducing the ability of the plant to absorb water and nutrients. This causes symptoms referred to as 'dieback' which can lead to plant death.

Under favourable conditions *Phytophthora* spp. can spread easily and quickly, destroying plants and plant communities. These guidelines to help minimise the risk of spreading *Phytophthora cinnamomi* also apply to other species of *Phytophthora* present in Australia, as the management of those species is similar. Thousands of Australian native plant species are susceptible to *Phytophthora cinnamomi*, and several of those species may be at risk of extinction due to its impacts. The dramatic impact of *Phytophthora* spp. infestations on plant communities may also lead to major declines in some insect, bird and animal species due to the loss of shelter, nesting sites and food sources.

*Phytophthora cinnamomi* thrives in warm, moist conditions with temperatures between 15°C and 30°C, and with rainfall greater than 400 millimetres a year. Its impact is greatest in Western Australia, Victoria, Tasmania and South Australia. The Northern Territory remains the only jurisdiction unaffected, as its environmental conditions are generally unfavourable to the pathogen.

*Phytophthora cinnamomi* spreads through soil, water, and organic matter. It can remain dormant for long periods during dry weather and is impossible in most situations to eradicate from infested areas, which means limiting further spread is critical. Any activity that moves soil, water or plant material can spread the disease. This includes soil on tools, footwear, and vehicles.

## Myrtle Rust

Myrtle rust is a disease caused by the fungus *Austropuccinia psidii*, (previously *Puccinia psidii*). It affects trees and shrubs in the Myrtaceae plant family—attacking young, soft, actively-growing leaves, shoot tips and young stems, as well as fruits and flower parts.

The first signs of rust infection are tiny, raised spots or pustules on infected leaves. After a few days, the pustules erupt into distinctive bright yellow spore masses. Left untreated, the disease can cause deformed leaves, heavy defoliation of branches, dieback, stunted growth and plant death.

Plants susceptible to myrtle rust are those in the Myrtaceae family, which includes bottle brush (*Callistemon* spp.), tea tree (*Melaleuca* spp. and *Leptospermum* spp.), Lilly pillies (*Syzygium* spp.) and eucalypts (*Eucalyptus* spp., *Angophora* spp. and *Corymbia* spp.). The Myrtaceae family in Australia is ecologically important, accounting for about 10% of Australia's native flora, with many Australian plant communities dominated by myrtaceous species.

- Arrive clean, leave clean – ensuring all clothing, hats, footwear, tools, equipment, machinery and vehicles are free of weed seeds, mud, soil and organic material before entering and leaving bushland;
- Schedule works for dry soil conditions where possible;
- Minimise soil disturbance;
- **Do not** remove any plant material from sites infested with myrtle rust.
- If using seedlings, purchase them from a supplier that can guarantee high standards of hygiene – such as NIASA-accredited businesses;
- Ensure transport and disposal of plant material does not introduce weeds to new areas.

## Procedures to Minimise Risk of Pathogen Transmission

When conducting works on site the following steps will help stop the spread of invasive species:

- If a site is infested with myrtle rust, **do not** remove any plant material from that site. Instead, dispose of plant waste by burial. If this is not possible, seal the waste in a plastic bag, seal the bag in a second bag and spray the outside of the bag with a solution of 70% ethanol or methylated spirits in 30% water before responsible disposal offsite;
- Ensure all materials taken onto site – such as seedlings, mulch, soil, gravel, rock, and sand – are certified free of weeds and pathogens. You can do this by purchasing from Nursery Industry Accreditation Scheme Australia (NIASA) accredited businesses, and ensuring materials conform to Australian Standards—for example, *AS3743–2003 Potting mixes* or *AS4454–2012 Composts, soil conditioners and mulches*;
- Create a checklist of hygiene procedures for project managers and participants to use;
- Ensure equipment is cleaned and disinfected with a solution of 70% ethanol or methylated spirits in 30% water. This includes footwear, tools, equipment, machinery, vehicles, backpacks, walking sticks, tent pegs and personal items;
- Remove all weed seeds, mud, soil and organic matter from any items or equipment which comes into contact with plants or the ground. Stay as clean as possible while in the bush.

## Disinfecting Clothing, Footwear, Equipment, and Personal Items

The following procedures apply to the disinfection of vehicles and machinery:

- Carry a hard brush and a spray bottle of disinfectant—made up of a solution of 70% ethanol or methylated spirits in 30% water. If you are able to carry more, assemble a simple hygiene kit;
- Set up a wash-down area for participants to wash and dry their face and hands and clean their footwear before entering and exiting the site;
- To clean footwear, first use a hard brush or stick to remove as much mud, soil and organic matter as possible before disinfecting with a solution of 70% ethanol or methylated spirits in 30% water—applied through a spray bottle or a footbath;
- Seal all personal rubbish in a bag and spray the outside of the bag with a solution of 70% ethanol or methylated spirits in 30% water before responsible disposal offsite;
- Collect all removed mud, soil and organic matter in a bag or bucket, and keep it out of clean bushland;
- Where myrtle rust is present, **d**isposable overalls and caps is to be worn over clothing upon entering a site and removed when leaving the site. However, in high-risk cases, also shower and change into clean clothes (including hats, gloves and footwear); and
- Wash all clothing, hats and gloves between site visits using warm or hot machine wash with detergent.

## Disinfecting Vehicles and Machinery

The following procedures apply to the disinfection of vehicles and machinery:

- Use a wash-down facility for vehicles and machinery if available, or wash-down on a hard, well-drained surface, for example a road, and on ramps if possible;
- Pay particular attention to cleaning mud flaps and tyres;
- Dispose of wash-down water so that it drains back into a low area of the infested zone away from waterways. If this is not possible, empty it into a waste container for responsible disposal offsite;
- Don't allow wash-down water to drain into clean bushland; and
- Don't drive through wash-down water.

The Australian Government, Department of the Environment (2015) has published a more comprehensive guide to the management of invasive plant diseases and weeds. The Title of this document is "*Arrive Clean, Leave Clean*" and can be found at the following website:

- https://www.agriculture.gov.au/sites/default/files/documents/arrive-clean-leave-clean.pdf

***Photo 7 – Myrtle rust on paperbark leaf (Melaleuca quinquenervia) (Source Department of Primary Industries- DPI)***

# FAUNA MANAGEMENT

The proposed development will involve the clearing of hollow-bearing trees as well as the demolition of derelict buildings/structures on site. These features are potential habitat for threatened fauna species including birds and microbats.

## Removal of derelict buildings/structures

The buildings and other man-made structures present within the site may provide potential roosting habitat within wall or ceiling cavities that have small openings to external foraging airspace. No microbat roosts have been observed in these structures during any surveys and the surrounding bushland would be considered to have better quality breeding and roosting habitat. However, as microbat species were found to have probable presence onsite, prior to demolition, these structures should be re-checked by a fauna ecologist as a precautionary measure to ensure no fauna are impacted by the demolition. If microbats are found to be occupying the buildings/structures, a fauna ecologist will be required to relocate them into an area outside of the development footprint. The timing of this must be completed just prior to demolition to avoid any microbats returning to the roosting location and being harmed during clearing.

Irrespective of whether microbats are located during the pre-clearing survey, it is highly recommended the fauna ecologist be present during the demolition in case any fauna are uncovered during the process. Any fauna injured during clearing will be handed to WIRES or a veterinarian for care and rehabilitation.

## Tree Removal & Hollow Relocation

As three (3) hollow-bearing trees are to be removed for the development, a fauna ecologist is required to conduct a pre-clearing inspection and to supervise the clearing process. Any encountered fauna species prior to or during clearing which cannot self-relocate are to be relocated by the fauna ecologist to areas where no future works are planned.

## Pre-clearing Inspection of Trees

At least two (2) weeks' notice will be needed prior to the planned date for clearing of any hollow bearing trees. This is required so as to allow for time for inspections of trees for use by fauna and to plan for the safe felling of the tree/removal of fauna if present. After notice is given of the planned removal of trees a fauna ecologist will inspect the trees for use by fauna. This may include inspection of trees at sunset (stag watching) that allows for the detection of diurnal fauna returning to hollows or nocturnal fauna leaving for the night. Inspections may also require camera probe inspection. All hollow-bearing trees proposed for removal shall be clearly marked with a 'H' Symbol to indicate removal under supervision by a fauna ecologist. A fauna ecologist is to be present at the removal of each habitat tree.

Hollows of high quality or with fauna recorded residing within are to be sectionally dismantled for relocation and all hollows are to be inspected for occupation, signs of previous activity and potential for reuse.

Subsequent to felling, hollows suitable for re-use are to be relocated within remaining bushland areas within the retained VMP area. After modification for reinstallation the hollow section is to be reattached to a recipient tree within the nearby retained areas as selected and directed by the fauna ecologist. The welfare and temporary holding of the residing animal(s) is at the discretion of the fauna ecologist. The hollow section should be well secured in the recipient tree in a manner that will not compromise the current or future health of that tree.

Where retained hollows are placed as on ground habitat and are not reattached to a new recipient tree then they are to be replaced with appropriately sized, high quality, long-life nest boxes. A minimum of four (4) nest boxes/salvaged hollows are to be installed.

## During Clearing

Where fauna is identified within a hollow and the risk of death or injury as a result of machine felling of the tree is high, the tree may need to be felled in sections. This will involve the removal of hollow limbs or sections by chainsaw with the hollow limb lowered to the ground for removal/relocation of fauna.

All hollow limbs will be inspected after felling for occupation by fauna. Any fauna will be removed and relocated to adjoining bushland.

Where young fauna are identified within a hollow whose survival will be at risk as a result of the removal of the hollow or the felling of the tree, then clearing will not be carried out until those young are old enough to leave the hollow and the care of the parents. It is suggested therefore that clearing is not carried out during breeding times when young are likely to be present within hollows (spring-early summer).

Where possible, hollow limbs removed from trees will be collected by the fauna ecologist for re-erection in retained bushland on site. Any fauna injured during clearing will be handed to WIRES or a veterinarian for care and rehabilitation.

## Hollow modification for relocation

Hollows that have been selected for relocation are to be modified to provide a dry, enclosed nest. Modifications may include:

- Attaching a 17+ millimetre thick marine ply/structural ply at the base which has been cut to provide a good seal and fixing with construction glue and galvanised screws.
- Attaching metal brackets or hardwood timber support batten to allow hollows to be screwed into a suitable branch or trunk.
- Entrance hollows to be positioned on installation to minimise water entry, located as per the 'nest box specifications.
- Hollow to be painted externally with a non-toxic wood preservative or external paint.

# NEST BOX INSTALLATION

A minimum of four (4) nest boxes/salvaged hollows will be installed within the restoration area or under the guidance of a fauna ecologist. Constructed nest boxes should replace good quality hollows being removed where salvaged hollows are not suitable. Supplementary nest boxes may need to be installed depending on the quality and condition of removed hollows.

For any nest boxes being installed, the nest box designs should be for target species as follows:

- 1-2cm sized entry, suitable for microchiropteran bats;
- 2.5-3 cm entries suitable for small birds (little lorikeet);
- 10-20cm entries suitable for medium to large parrot species;
- 20-25cm entries suitable for small arboreal marsupial species (ringtail possums and sugar gliders)

It is proposed that 1 of each nest box shall be utilised.

## Nest Box Design

The following specifications apply to the construction of the nest boxes. I also refer to the generic diagrams in Figures 4, 5, 6 and 7.

- Timber is to be of high-grade ply 17+ mm thick (MDF, particle board and low-grade ply are not acceptable).
- The lid is to be hinged at the rear side of the box that is affixed to the tree to allow internal inspections from the front side. Lids are to be well sloped to the front to allow runoff by rain. Hinges are to be robust (not small) and made of brass, stainless steel or galvanised. Lids are to be larger than the overall cross-sectional size of the box and placed so that a small eave exists on all sides to prevent entry of rain.
- Two vertical timber supports (approximately 30x30mm timber strips 150 mm apart) are to be attached down the rear face of the box so that there are two points of attachment to the trunk on a curved surface and the box does not rock in the wind. This will also provide easy attachment points to the trees without having to screw through the inside of the box. These are to be made of treated pine and any screws into this (for hinges etc.) should be manufactured for use in treated pine or stainless. Holes at both ends of both supports are to be predrilled for easy attachment to trees. Timber supports should not be placed directly onto the box but with small timber spacers so that an eave is permissible along this side of the roof.
- Joints are to be glued and screwed for strength. Glue should be labelled as non-toxic wood glue.
- All fasteners used are to be weather resistant stainless steel, galvanised or other. Screws into the treated pine supports are to be stainless steel or screws manufactured for use in treated pine.
- All fasteners for tree attachment are to be supplied (stainless steel or treated pine coach screws). These are to be a suitable gauge depending on the size of bow and suitable length to pass through the vertical timber supports, through the bark and cambium, and into a sufficient extent of heartwood. Heartwood penetration will depend on the size of the box. Screws for small boxes should extend a minimum of 20mm into the heartwood of hardwood eucalypts and medium boxes ~40mm. All boxes are to be screwed so that a small distance for growth exists between the timber supports and the trunk. This can be achieved with a small stainless sleeve over the screw.
- 5 mm drainage holes are to be drilled in each corner at the base of each nest box.
- Exterior of the boxes (including treated pine supports) are to be painted with a primer and then a minimum of two coats of external non-alcohol based acrylic paint. The colour selected should be consistent with the colour of the recipient trunk and therefore recipient trees should ideally be prior selected.

## Nest Box Placement

- Nest boxes are to be erected by a qualified arborist under the supervision of the project ecologist or fauna ecologist. A fauna ecologist is to locate appropriate trees and locations for installing the nest boxes.
- All replacement nest boxes are to be secured to trees at a minimum height of four metres above ground level facing the east to northeast direction. Place nest boxes as high as physically possible within a tree preferably using a cherry picker or tree climber/arborist - generally the higher the better for consideration to most species.
- Nest boxes and re-erected limbs are not to be placed near locations where public access is planned.
- The larger and more mature tree are to be selected to be nest box recipients where available. This will comparatively reduce the weighted stress on the tree, make the box less visible and result in less change in growth ratio affecting the selected attachment method. Boxes are preferably to be placed on the trunk for structural stability and protection from falling branches.
- Place nest boxes away from continual direct mid-day summer sun.
- Place nest boxes with large entry holes away from any prevailing winds when close to open water-bodies. E.g., protect from strong southerly winds close to the ocean and contrastingly cool-hot westerly winds in different seasons.
- Attach nest boxes securely so that they do not shift or shake in response to strong winds or being knocked by the movements of heavier animals, e.g. Possums and goannas.
- To ensure nest boxes are inaccessible to cats and rats or to also assist native species by exclusion of possums, the base of the trunk or branches may also require the installation of tree guards or exclusion collars.
- Nest boxes should ideally be placed in such a way that they are accessible for management but concealed from interference.
- These artificial nest boxes / structures must be accessible for maintenance purposes with an expected life span of 20 years.

## Nest Box Attachment

Nest boxes are to be appropriately affixed to a recipient tree under the guidance of a fauna ecologist. Different methods of attachment to the tree are available. *Travers bushfire & ecology* generally recommends that the boxes should be fixed with robust stainless steel or treated pine coach screws that penetrate through the cambium and into the heartwood of the tree to ensure a very secure attachment. Provided that any cambium damage to a tree is not left as an open wound then the chance of fungal infection or insect attack is significantly reduced and the tree will grow around the screw. Any other method of attachment selected should also ensure the box is secured to prevent movement or fall and allows for the future growth of the tree without any cambium constriction over the entire life of the nest box.

## Nest Box Maintenance

- All nest boxes and re-erected limbs will be inspected annually for a minimum of five (5) years and any damaged, or in danger of falling, are to be repaired or replaced.
- Deterring mynas and starlings from re-nesting is not easy; these pests are very persistent, and constant vigilance is necessary. This also means that you must have convenient regular access to the nest-box, and that you must be aware of what creatures are using it for what purposes.

- Nest boxes found to be utilised by threatened or otherwise significant fauna may be prioritised for ongoing management to ensure their longevity and replicate their design/placement characteristics

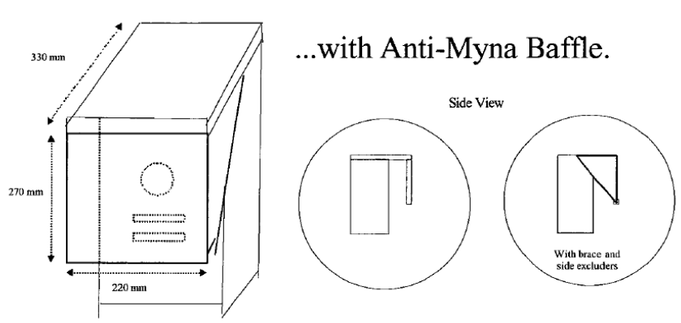


**Figure 4 - Anti-Myna baffle**

***Table 4 – Typical nest box dimensions for various fauna***

| SPECIES | INTERNAL SIZES | DEPTH/ LENGTH | ENTRY DIAMETER | VERT/ HOR | HEIGHT | REF |
|---|---|---|---|---|---|---|
| Bat sp. | 70-100 x 150-240 mm | 200-250 mm | 15-20 mm slit | v | - | BFNC (n.d.) |
| Bat, Chocolate Wattled | - | - | 10 mm slit | v | - | Trainor (1995) |
| Bat, Gould's Wattled | - | - | 10 mm slit | v | - | Trainor (1995) |
| Bat, Lesser Long-eared | - | - | 10 mm slit | v | - | Trainor (1995) |
| Little Lorikeet | 120 mm | 600 mm | 25-30mm | h | - | Trainor (1995) |
| Crimson Rosella | 150-200 mm | 350-800mm | 100-200 mm | v/h | 5-6 m | Trainor (1995) |
| Ringtail Possum | 250mm | 400mm | 60-80mm | V | - | BFNC (n.d.) |
| Sugar glider | 200mm | 450mm | 35-40mm | v | - | BFNC (n.d.) |

*(Source: Birds Australia Supplement No. 5 – Nest Boxes for Natives)*

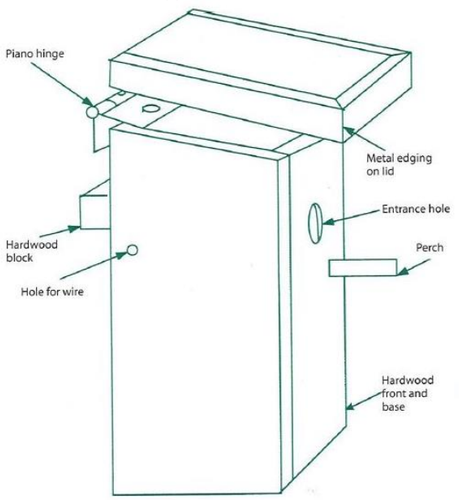


**Figure 5 - A generic nest box design**
(Source - From Alan and Stacey Franks, 2003)

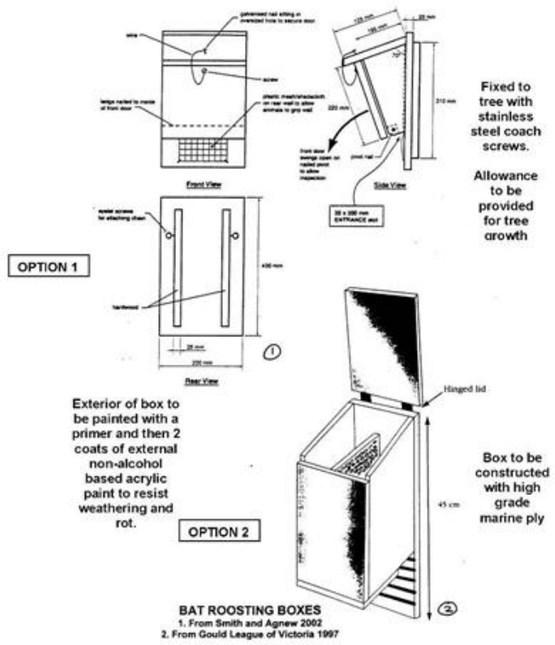


**Figure 6 - Microbat roost box detail**

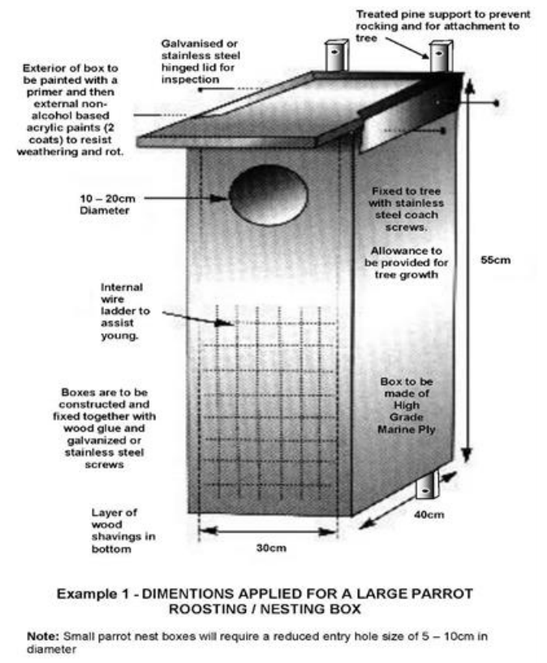


**Figure 7 – Typical dimensions for large parrot box**

## ASSET PROTECTION ZONE MANAGEMENT

The entire property is to be managed to maintain a fuel reduced state to minimize the risk for fire transmission. The following fuel reduction methodology shall be adopted.

***Table 5 – Asset protection zone management requirements***

| All Management Zones within the property | |
|---|---|
| Trees | 1. Trees at maturity should not touch or overhang the building.<br>2. Lower limbs should be removed up to a height of 2m above the ground;<br>3. Preference should be given to retaining smooth barked and evergreen trees. |
| Shrubs | 4. Clumps of shrubs are to avoid adjacent to exposed windows and doors.<br>5. Shrubs are to be pruned where possible to allow separation between clumps but to encourage seasonal flowering |
| Ground covers | 6. All lawn areas are to be kept mown to a height of less than 100mm; and<br>7. Leaves and other combustible debris should be removed 3-4 times a year to avoid build-up of excess litter exceeding 4 tonnes per ha. |
| Weeds | 8. All weeds should be removed in accordance with best practice guidelines, and measures taken to prevent their further spread |
| Landscaping | 9. Suitable impervious areas being provided immediately surrounding the building such as courtyards, paths and driveways;<br>10. Restrict planting in the immediate vicinity of the building which may over time and if not properly maintained come into contact with the building;<br>11. When considering landscape species consideration needs to be given to estimated size of the plant at maturity;<br>12. Avoid species with rough fibrous bark, or which retain/shed bark in long strips or retain dead material in their canopies;<br>13. Use smooth bark species of trees species which generally do not carry a fire up the bark into the crown;<br>14. Avoid planting of deciduous species that may increase fuel at surface / ground level (i.e. leaf litter);<br>15. Avoid climbing species to walls and pergolas;<br>16. Locate combustible materials such as woodchips / mulch, flammable fuel stores away from the building;<br>17. Locate combustible structures such as garden sheds, pergolas and materials such timber garden furniture away from the building; and<br>18. Use of low flammability vegetation species. |

A site review has identified the following site-specific specifications for APZ management to achieve compliance. The site has low bushfire risk and is otherwise heavily managed. Due to the relatively small site area/s to be managed it is recommended that target fuel load should be maintained by mechanical (hand) removal or dispersal of fuel

- The surface fuel loads should not exceed four (4) tonnes per hectare.
- Elevated shrubs and trees should be uplifted, that is, have lower branches (less than 2 metres from ground level) removed.
- Weed and non-endemic species should be removed, except where overriding guidelines or regulation (e.g. tree preservation or heritage listing) prevents removal.
- Fuel reduction is to be undertaken yearly or as necessary, prior to the commencement of the bushfire season (pre-spring) and shall be monitored as part of the consent approval with compliance certification as part of the annual deliverables to Council.

Compliance with tree canopy separation requirements is to be assessed on site and is not able to be assessed by plan. The amount of tree trimming to achieve IPA compliance requirements is subject to the amount of canopy connection after the nominated trees have been removed for the proposed development.

*Table 6 – Program of works*

| Action | Responsibility |
|---|---|
| **Stage 1 – Pre-restoration works** | |
| Formation of site management team and establish supervision and consultation processes – minimum project ecologist, qualified bushland restoration contractor and site manager | Site project manager |
| Erection of erosion control fencing | Site manager / project ecologist |
| Installation of primary exclusion / protection fencing and access gates | Project manager / project arborist |
| Baseline vegetation condition assessment and establishment of monitoring plots | Project ecologist |
| Commencement of primary weed control | Suitably qualified bushland restoration contractor |
| Commencement of seed collection and propagation contracts | Bushland restoration contractor / project ecologist |
| Provide certificates of compliance to the appointed project certifier and council | Project ecologist |
| Check buildings for fauna habitat, and check the development footprint for Dural Land Snail prior to clearance | Fauna ecologist |
| Presence of a fauna ecologist and project arborist during clearing to review tree protection measures and dismantling of hollows | Fauna ecologist and project arborist |
| **Stage 2 – Restoration Works** | |
| Supervision of any vegetation and management works | Site project manager in association with the project ecologist |
| Monitor erosion control measures (monthly – especially after heavy rain) and replace if required | Contractor with advice of project manager |
| Waste removal | Bushland restoration contractor |
| Complete revegetation works | Bushland restoration contractor / project manager |
| Installation of nest boxes or salvaged hollows | Fauna ecologist and climber |
| Commencement of secondary weed control and maintenance weed control | Contractor / bushland restoration contractor |
| Maintenance of fencing and signage around protected vegetation | Contractor |
| Continuation of primary restoration and revegetation works | Contractor / suitably qualified bushland regenerator |
| Provide certificates of compliance at practical completion | Project ecologist |
| **Stage 3 – Post Restoration Works** | |
| Further enrichment planting within revegetation areas if required. | Bushland restoration contractor with advice of project ecologist |
| Continuation of regeneration and weed control maintenance. | Contractor / bushland regenerator |
| Monitoring of retained vegetation at six (6) months, twelve (12) months and annually for five (5) years post construction stage. | Project ecologist |
| Monitoring of powerful owl | Project ecologist |
| Conduct maintenance beyond five (5) years if required | Site manager with advice of project ecologist |
| Provide certificates of compliance at end of each year during the 5-year maintenance period | Project ecologist |

The following typical timeline (Table 7) is provided to indicate a possible overall timing of restoration works. The commencement of the maintenance period of five (5) years is subject to the completion of primary restoration works as certified by the project ecologist. A certificate of practical completion will be required as evidence of satisfactory completion prior to the commencement of the maintenance period.

The successful implementation of restoration works may affect the release of any required bonds as required. Upon engagement, contractors are expected to meet the following typical schedule of works**.**

*Table 7 – Typical restoration timeline*

| ID | Task Name | Duration | Primary Restoration Works | | | | | | | | | | | | Year 1 Maintenance | | | | | | | | | | | | Year 2 -5 (in perpetuity post year 5) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | **STAGE 1 - PRECOMMENCEMENT (Pre Construction Certificate)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **1.0** | **PROJECT INITIATION** | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.1 | Confirm funding | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.2 | Preparation of contract schedules | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.3 | Submission of fee proposals | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.4 | Contractor approvals, engagement of project ecologist & bushland restoration contractor | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **2.0** | **SITE PREPARATION AND PROPAGATION** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.1 | Pre-commencement vegetation condition assessment | 1 day | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.2 | Seed collection | 12 months | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.3 | Plant propagation (initial & contingency) | 8 months | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.4 | Installation of protective fencing and signage | 2 weeks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.5 | Obtain permit & undertake pest control (if necessary) | 6 weeks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.6 | Commence Primary weed control | 1-6 months | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | **STAGE 2 DURING CONSTRUCTION WORKS (post Construction Certificate and pre subdivision certficate)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **3.0** | **WEED CONTROL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.1 | Complete Primary Weed Control | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.2 | Secondary weed control | 3-6 months | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **4.0** | **REVEGETATION WORKS** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.1 | Site preparation - sediment and erosion control, removal of waste | 1-5 days | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.2 | Revegetation works | 6 months | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.3 | Regeneration works | 8 months | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.4 | Initial watering & maintenance | 9 months | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.5 | Pest Control (if required) | 3 months | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.6 | Installation of minimum 10 nest boxes/salvaged hollows | 2 weeks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | **STAGE 3 - POST CONSTRUCTION WORKS (from Practical completion of Stage 2)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **5.0** | **BUSH REGENERATION & REVEGETATION MAINTENANCE** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.1 | Watering, maintenance, weed control and repairs | 5 years | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.2 | Ongoing regeneration of existing bushland areas | 5 years | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.3 | Pest Control (if required) | 5 years | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **6.0** | **MANAGEMENT AUDITING AND MONITORING** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.1 | Contractor supervision / monitoring | 5 years | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.2 | Ongoing supervision/auditing/monitoring | 5 years | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3 | Submission of annual reporting | 5 years | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.4 | Review and update to VMP post 5 years | Year 5 only | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **7.0** | **CONTINGENCY & MAINTENANCE WORKS (Subject to Audits)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7.1 | Target priority and environmental weeds | 2 weeks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7.2 | Replacement planting | 1 month | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7.3 | Watering & maintenance | 3-6 months | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7.4 | Medium term maintenance | 6 months | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7.5 | Submission of compliance certification (to 5 yrs maintenance) | As required | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

CASTLE HILL ROAD

HT3n
HT2n
SHT1
SHT5
N
X
HT1n
N
X
HT4n

Poor
Very poor

WEED CONDITION

HT2s
X
N
N
X
HT1s

Good
Fair
Poor

WEED CONDITION

ORATAVA AVENUE

## Restoration Performance Targets

The following restoration performance targets are to be audited and compliance certificate issued by the project ecologist demonstrating satisfactory completion of the works in accordance with the VMP and as shown on Schedule 1.

1. Install a 1.2m high permanent ringlock or chainlink protective fence with metal posts and railing is to be around the construction footprint as shown in Schedule 1.
2. Final weed coverage will not exceed more than 15% coverage in any structural layer at the end of Year 1 and less than 5% at the end of Year 5, with no more than 1% comprising high threat exotics or species listed under the *Biosecurity Act*.
3. 1,400 groundcovers to be planted, with a species mix comprising 10 species or more, and a survival rate of at least 90%. Plantings are to be protected with cardboard boxes or similar for at least the first year.
4. As vegetation on site is cleared, logs are to be stockpiled for future use within the restoration area. A minimum of 50m of logs (minimum 3m long and 10cm width or greater) are to be placed within the APZ for ground refuge.
5. Four (4) nest boxes/salvaged hollows installed to provide habitat for hollow-dependent fauna.
6. All preconstruction tasks such as temporary fencing, erosion control, marking of retained trees on the edge of the protection area, arborist supervision of clearing, and project ecologist supervision of hollow dismantling is to be signed off with a compliance certificate.
7. APZ monitoring is to comply with inner protection area standards, reviewed annually for the duration of the VMP.
8. Mitigation measures for pathogen control are to be adhered to and monitored.
9. Displaced fauna (if found), are to treated in accordance with the guidelines of this VMP.
10. Where annual compliance is not achieved, the project ecologist shall advise of the supplementary works required.

**Legend**

- Study area (source: LPI)
- Proposed lot boundary
- Contours - 1m (source: LiDAR)
- Proposed APZ fencing (168.66m)
- Asset Protection Zone (APZ)
- APZ management to inner protection area standards
- Hollow bearing remove
- Hollow bearing retain
- Apply suitable tree protection zone fencing during the constuction period
- Significant habitat tree
- Hollow-bearing tree
- Sediment and erosion control fencing (183.26m)

**Potential Powerful Owl hollows**

- Low
- Good
- Nest (stag-watched)
- 10x10m monitoring plots, indicative locations only
- X Photo monitoring points
- N Nest boxes (4) indicative locations only
- Arborist assessed tree
- Native groundcover planting of PCT 3136

**Plant Community Types (PCTs)**

- PCT 3262- Sydney Turpentine Ironbark Forest (managed / derived) (0.48ha)
- PCT 3136- Blue Gum High Forest (moderate-good) (1.90ha)
- PCT 3136 Blue Gum High Forest (managed/derived) (1.08ha)
- Planted native vegetation (0.21ha)
- Cleared (1.25ha)

Aerial source: Nearmap

TRAVERS BUSHFIRE & ECOLOGY
A TBE ENVIRONMENTAL COMPANY

| PROJECT & MXD REFERENCE | DATE & ISSUE NUMBER | SCALE & COORDINATE SYSTEM |
|---|---|---|
| 121-131 Oratava Avenue & 87-89 Castle Hill Road, West Pennant Hills<br>MEC03_VMP001 | 24/05/2024<br>Issue 1 | 1:650 @ A3<br>GDA 1994 MGA Zone 56 |

0 10 20 m

TITLE

# Schedule 1 - Vegetation Management Plan

Document Path: N:\GIS STORAGE\N Drive\19MEC03_OratavaAveCastleHillRd_WestPennantHills\MXDs\MEC03_VMP001.mxd

Disclaimer: The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.

## ATTACHMENT 1 – RESTORATION WORKS COSTING (5 YEARS)

| Task No | Description | Labour | | | | | | Materials/Subcontractors | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Area / Volume | work rate/m2 | Unit | Quantity | Rate | Total | Unit | Quantity | rate | M/Up | Subtotal | Total Personnel/ Subcontractor/Supply Costs |
| **1** | **Project Control - Restoration Ecologist** | | | | | | | | | | | | |
| 1.1 | Fauna search pre clearing | | | hr | 7.0 | $240.00 | $1,680.00 | | | | | | |
| 1.2 | Arborist presence during clearing | | | hr | 20.0 | $240.00 | $4,800.00 | | | | | | |
| 1.3 | Fauna ecologist presence during clearing | | | hr | 20.0 | $240.00 | $4,800.00 | | | | | | |
| 1.4 | Quarterly inspections (year 1 only) | 4 sessions | | hr | 16.0 | $240.00 | $3,840.00 | | | | | | |
| | **Subtotal** | | | | | | **$15,120.00** | | | | | **$0.00** | **$15,120.00** |
| | | | | | | | | | | | | | |
| **2** | **Site Preparation** | | | | | | | | | | | | |
| 2.1 | Installation of access gates x 4 | | | | | | | gates | 4 | $250.00 | 1.15 | $1,150.00 | |
| 2.2 | Fencing of APZ | | | | | | | fencing | 160 | $27.50 | 1.15 | $5,060.00 | |
| 2.3 | Sediment fencing | | | | | | | fencing | 180 | $15.00 | 1.15 | $3,105.00 | |
| 2.4 | Nest box supply and install x4 | | | | | | | boxes | 4 | $280.00 | 1.15 | $1,288.00 | |
| | **Subtotal** | | | | | | | | | | | **$10,603.00** | **$10,603.00** |
| | | | | | | | | | | | | | |
| **3** | **Weed Control** | | | | | | | | | | | | |
| 3.1 | Primary weed control | 0.54 | 25 | hr | 216.0 | $55.00 | $11,880.00 | | | | | | |
| | **Subtotal** | **0.54** | | | | | **$11,880.00** | | | | | | **$11,880.00** |
| | | | | | | | | | | | | | |
| **4** | **Secondary and Tertiary Maintenance (five years) including APZ management** | | | | | | | | | | | | |
| **4.1** | Secondary weed control | 0.54 | 40 | hr | 540.0 | $55.00 | $29,700.00 | | | | | | |
| 4.2 | Weed control maintenance year 1 | 0.54 | 55 | hr | 392.7 | $55.00 | $21,600.00 | | | | | | |
| 4.3 | Weed control maintenance year 2 | 0.54 | 70 | hr | 308.6 | $55.00 | $16,971.43 | | | | | | |
| 4.3 | Weed control maintenance year 3 | 0.54 | 85 | hr | 254.1 | $55.00 | $13,976.47 | | | | | | |
| 4.5 | Weed control maintenance year 4 | 0.54 | 100 | hr | 216.0 | $60.00 | $12,960.00 | | | | | | |
| 4.6 | Weed control maintenance year 5 | 0.54 | 125 | hr | 172.8 | $60.00 | $10,368.00 | | | | | | |
| | **Subtotal** | **0.54** | | | | | **$105,575.90** | | | | | | **$105,575.90** |
| | | | | | | | | | | | | | |
| **5** | **Revegetation Works** | | | | | | | | | | | | |
| 5.1 | PCT 3136 groundcover planting | 1400 | 12 | hr | 116.7 | $55.00 | $6,416.67 | virotube | 1400 | $1.50 | 1.15 | $2,415.00 | |
| 5.2 | Watering and maintenance | 1400 | 50 | hr | 28.0 | $55.00 | $1,540.00 | | | | | | |
| | **Subtotal** | | | | | | **$7,956.67** | | | | | **$2,415.00** | **$10,371.67** |
| | **TOTAL OF ONSITE WORKS** | | | | | | | | | | | | |
| | | | | | | | | | | | | | **$153,550.57** |
| **6** | **Contingency Works** | | | | | | | | | | | | |
| 6.1 | 15% of total cost of all onsite works | | | | | | | | | | | | **$23,032.58** |
| | | | | | | | | | | | | | |
| **7** | **Restoration Ecologist - Reporting, Monitoring & Auditing (5 years)** | | | | | | | | | | | | |
| 7.1 | Monitoring inspections (1 day every 6 months over 5 years) | 10 sessions | | hr | 50.0 | $240.00 | $12,000.00 | | | | | | |
| 7.2 | Annual Reports - 1 baseline report plus 4 updates | 5 sessions | | hr | 35.0 | $240.00 | $8,400.00 | | | | | | |
| 7.3 | Compliance Certification - 3 certificates | 3 sessions | | hr | 21.0 | $240.00 | $5,040.00 | supply | | | | | |
| | **Subtotal** | | | | | | **$25,440.00** | | | | | | **$25,440.00** |
| | **TOTAL COSTS** | | | | | | | | | | | | **$202,023.15** |