# Concept Views

F On exit to the restaurant and accommodation Pods A,B & C, the central area provides a safe haven for many of the animals, where they can shelter below a sandstone ledge. Behind this ledge are a grove of trees with koalas.

# 3 Technical Section



# 3.1 Existing Planting

## Existing Trees

There are a number of trees existing on site which are indigenous to the Sydney Sandstone Gully vegetation of Mosman. Where possible these are to be retained and protected during construction works to ensure an established, authentic local landscape exists from the opening day of the Australia Habitat and Taronga Wildlife Retreat.

In addition, there are a number of Heritage listed trees, and trees identified as being of high importance based on their age, health, species, and ability to contribute to the amenity of the landscape.

A detailed Landscape Plan accompanies this application (**Appendix E**), which proposes planting of endemic shrubs and trees in order to mitigate lost trees and provided for the long term establishment of native species consistent with the existing native species on site. Notably the proposal does not seek to remove any remnant species (refer to **Appendix H**).

NSW Atlas Searches identify recorded sightings and maps of plants or animals in a particular area. The NSW Atlas Search undertaken on the site demonstrates that there are no endangered or threatened species within the development site area, and no remnant vegetation or endangered species will be impacted.

For a full description and locations of all trees to be retained see arborist report (*Arboricultural Impact Appraisal and Method Statement*, 10 March 2016, by 'Naturally Trees').

**Indigenous Species to be retained**

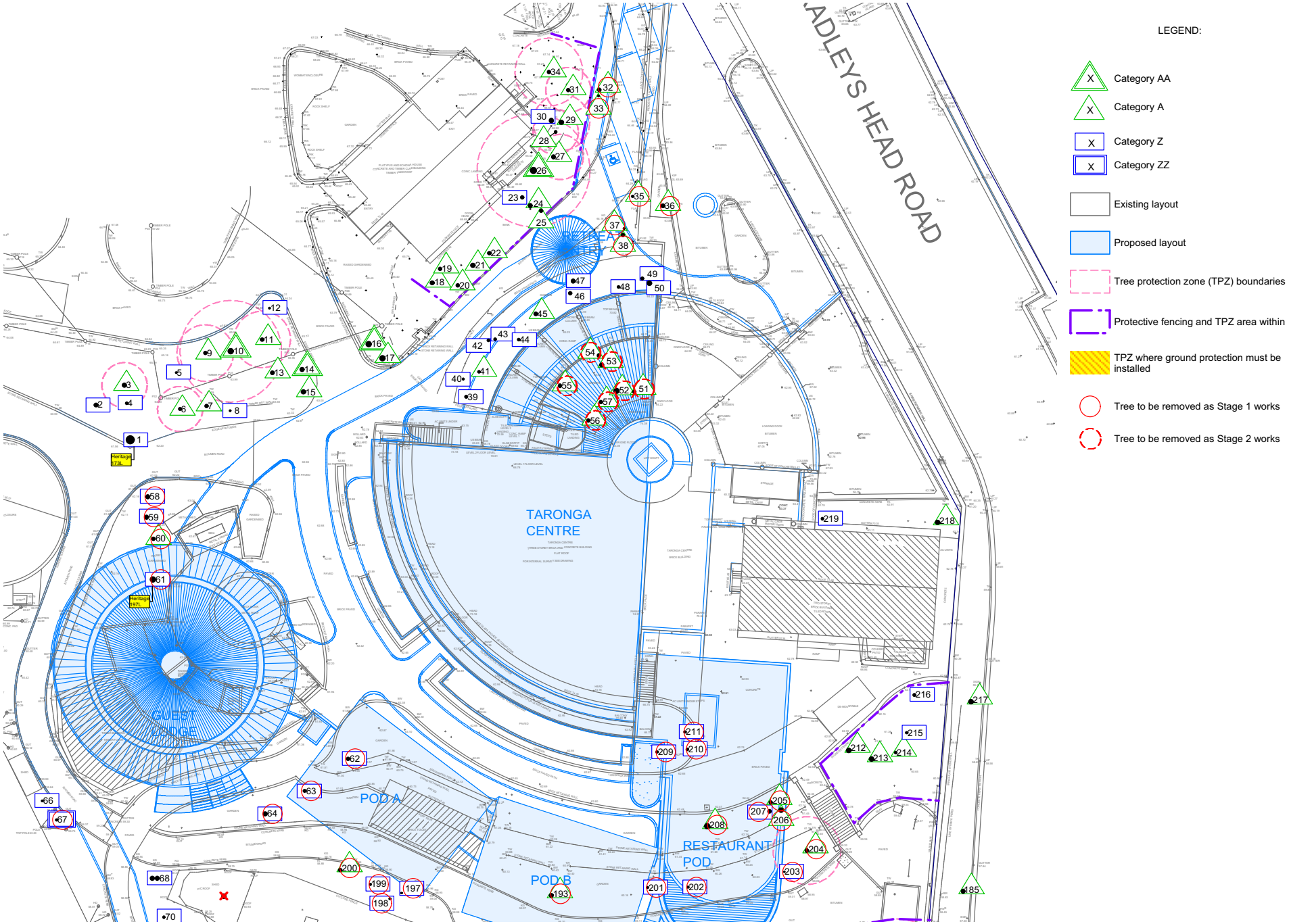
| | |
|---|---|
| *Allocasuarina torulosa* | Forest Sheoak |
| *Banksia serrata* | Old Man Banksia |
| *Ceratopetalum gummiferum* | NSW Christmas Bush |
| *Elaeocarpus reticulatus* | Blueberry Ash |
| *Eucalyptus punctata* | Grey Gum |
| *Eucalyptus saligna* | Sydney Blue Gum |
| *Glochidion ferdinandi* | Cheese Tree |
| *Pittosporum undulatum* | Sweet Pittosporum |
| *Syncarpia glomulifera* | Turpentine Tree |

**Key Native Species to be retained**

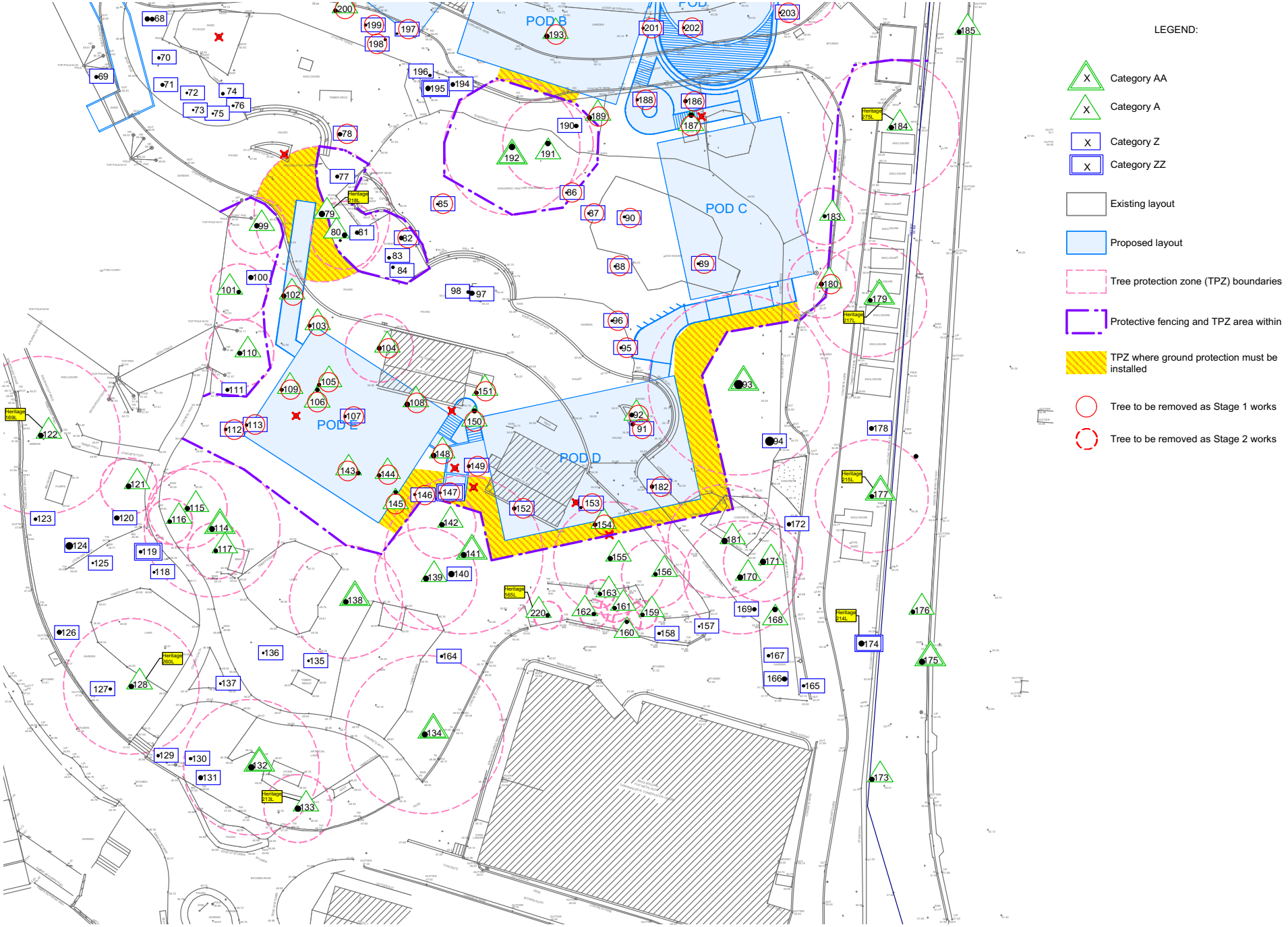
| | |
|---|---|
| *Archontophoenix alexandrae* | Alexander Palm |
| *Banksia integrifolia* | Coast Banksia |
| *Eucalyptus botryoides* | Southern Mahogany |
| *Eucalyptus robusta* | Swamp Mahogany |
| *Lophostemon confertus* | Brush Box |
| *Polyscias murrayi* | Pencil Cedar |
| *Schefflera actinophylla* | Australian Umbrella Tree |

## Heritage and High Value Trees

| | |
|---|---|
| *Casuarina cunninghamiana* | River Sheoak |
| *Ficus microcarpa var. hillii* | Hill's Weeping Fig |
| *Gardenia sp.* | Gardenia |
| *Grevillea robusta* | Southern Silky Oak |
| *Podocarpus elatus* | Plum Pine |
| Syzygium paniculata | Lilly Pily |
| *Toona ciliata* | Australian Red Cedar |




These plans and following tables to be read in conjunction with 'Arboricultural Impact Appraisal and Method Statement' prepared by *Naturally Trees* (10 March 2016)




These plans and following tables to be read in conjunction with 'Arboricultural Impact Appraisal and Method Statement' prepared by *Naturally Trees* (10 March 2016)

NOTE: Colour annotation is AA & A trees with green background; Z & ZZ trees with blue background; trees to be removed in red text.

| Heritage Item No. | No. | Genus species | Height | Spread | DBH | TPZ | Foliage % | Age class | Defects/Comment | Location | Services | Significance | Tree AZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 173L | 1 | *Eucalyptus botryoides* | 14 | 12 | 800 | **9.6** | 80% | M | Root loss/damage | Garden bed | Adjacent driveway | H | **Z10** |
| | 2 | *Eucalyptus punctata* | 9 | 6 | 300 | **3.6** | 70% | M | Borer, Cambium damage into root zone | Garden bed | Nil | M | **Z9** |
| | 3 | *Polyscias murrayi* | 7 | 5 | 200 | **2.4** | 80% | M | Co-dominant | Garden bed | Nil | L | **A1** |
| | 4 | *Eucalyptus punctata* | 6 | 4 | 150 | **2** | 80% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 5 | *Syncarpia glomulifera* | 5 | 3 | 150 | **2** | 90% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 6 | *Eucalyptus robusta* | 8 | 6 | 200 | **2.4** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 7 | *Eucalyptus robusta* | 8 | 6 | 200 | **2.4** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 8 | *Banksia integrifolia* | 5 | 3 | 100 | **2** | 80% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 9 | *Allocasuarina torulosa* | 7 | 4 | 250 | **3** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 10 | *Eucalyptus botryoides* | 16 | 12 | 450 | **5.4** | 80% | M | Nil | Garden bed | Nil | H | **AA1** |
| | 11 | *Lophostemon confertus* | 8 | 7 | 250 | **3** | 90% | M | Nil | Garden bed | Nil | M | **A1** |
| | 12 | *Buckinghamia celsissima* | 5 | 3 | 100 | **2** | 90% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 13 | *Eucalyptus botryoides* | 9 | 6 | 200 | **2.4** | 70% | S | Co-dominant | Garden bed | Nil | M | **A1** |
| | 14 | *Eucalyptus botryoides* | 16 | 12 | 400 | **4.8** | 90% | M | Nil | Garden bed | Nil | H | **AA1** |
| | 15 | *Banksia integrifolia* | 6 | 7 | 350 | **4.2** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 16 | *Eucalyptus punctata* | 14 | 12 | 500 | **6** | 80% | M | Nil | Garden bed | Adjacent structure | H | **AA1** |
| | 17 | *Eucalyptus punctata* | 14 | 10 | 400 | **4.8** | 80% | M | Nil | Garden bed | Adjacent structure | H | **A1** |
| | 18 | *Pittosporum undulatum* | 9 | 6 | 250 | **3** | 80% | M | Co-dominant | Garden bed | Nil | M | **A1** |
| | 19 | *Pittosporum undulatum* | 9 | 6 | 250 | **3** | 80% | M | Co-dominant | Garden bed | Nil | M | **A1** |
| | 20 | *Glochidion ferdinandi* | 9 | 6 | 300 | **3.6** | 90% | M | Nil | Garden bed | Nil | M | **A1** |
| | 21 | *Eucalyptus punctata* | 14 | 8 | 350 | **4.2** | 70% | M | Nil | Garden bed | Nil | H | **A1** |
| | 22 | *Pittosporum undulatum* | 7 | 4 | 200 | **2.4** | 70% | M | Nil | Garden bed | Nil | L | **A1** |
| | 23 | *Olea sp.* | 6 | 4 | 150 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z3** |
| | 24 | *Eucalyptus botryoides* | 10 | 5 | 300 | **3.6** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 25 | *Glochidion ferdinandi* | 6 | 4 | 200 | **2.4** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 26 | *Eucalyptus robusta* | 16 | 16 | 500 | **6** | 80% | M | Nil | Garden bed | Adjacent building | H | **AA1** |
| | 27 | *Glochidion ferdinandi* | 6 | 5 | 200 | **2.4** | 90% | M | Nil | Garden bed | Nil | L | **A1** |
| | 28 | *Glochidion ferdinandi* | 6 | 5 | 200 | **2.4** | 90% | M | Nil | Garden bed | Nil | L | **A1** |
| | 29 | *Pittosporum undulatum* | 6 | 5 | 250 | **3** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 30 | *Eucalyptus punctata* | 14 | 12 | 350 | **4.2** | 70% | M | Borer, Cavity in trunk base | Garden bed | Adjacent building | M | **Z9** |
| | 31 | *Glochidion ferdinandi* | 6 | 5 | 200 | **2.4** | 90% | M | Nil | Garden bed | Nil | L | **A1** |
| | 32 | *Glochidion ferdinandi* | 6 | 5 | 200 | **2.4** | 90% | M | Nil | Garden bed | Nil | L | **A1** |
| | 33 | *Glochidion ferdinandi* | 6 | 5 | 200 | **2.4** | 90% | M | Nil | Garden bed | Nil | L | **A1** |
| | 34 | *Lophostemon confertus* | 12 | 8 | 300 | **3.6** | 80% | M | Nil | Garden bed | Nil | H | **A1** |
| | 35 | *Brachychiton acerifolius* | 7 | 4 | 150 | **2** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 36 | *Banksia integrifolia* | 8 | 5 | 300 | **3.6** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 37 | *Brachychiton acerifolius* | 7 | 4 | 150 | **2** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 38 | *Toona ciliata* | 9 | 7 | 250 | **3** | 90% | M | Nil | Garden bed | Nil | M | **A1** |
| | 39 | *Archontophoenix alexandrae* | 7 | 3 | 200 | **2.4** | 90% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 40 | *Tristaniopsis laurina* | 5 | 5 | 150 | **2** | 90% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 41 | *Glochidion ferdinandi* | 6 | 5 | 200 | **2.4** | 90% | M | Nil | Garden bed | Nil | L | **A1** |
| | 42 | *Cyathea cooperi* | 6 | 3 | 150 | **2** | 90% | M | Nil | Garden bed | Nil | M | **Z1** |
| | 43 | *Archontophoenix alexandrae* | 7 | 3 | 200 | **2.4** | 90% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 44 | *Archontophoenix alexandrae* | 7 | 3 | 200 | **2.4** | 90% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 45 | *Archontophoenix alexandrae* | 9 | 3 | 200 | **2.4** | 90% | S | Nil | Garden bed | Nil | M | **A1** |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 46 | *Archontophoenix alexandrae* | 7 | 3 | 200 | **2.4** | 90% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 47 | *Schefflera actinophylla* | 6 | 3 | 150 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z3** |
| | 48 | *Archontophoenix alexandrae* | 7 | 3 | 200 | **2.4** | 90% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 49 | *Archontophoenix alexandrae* | 7 | 3 | 200 | **2.4** | 90% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 50 | *Schefflera actinophylla* | 6 | 3 | 150 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z3** |
| | 51 | *Archontophoenix alexandrae* | 12 | 4 | 250 | **3** | 90% | M | Nil | Garden bed | Nil | M | **A1** |
| | 52 | *Toona ciliata* | 14 | 12 | 500 | **6** | 80% | M | Nil | Garden bed | Nil | H | **A1** |
| | 53 | *Toona ciliata* | 12 | 8 | 350 | **4.2** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 54 | *Archontophoenix alexandrae* | 12 | 4 | 250 | **3** | 90% | M | Nil | Garden bed | Nil | M | **A1** |
| | 55 | *Archontophoenix alexandrae* | 12 | 4 | 250 | **3** | 90% | M | Nil | Garden bed | Nil | M | **A1** |
| | 56 | *Brachychiton discolor* | 12 | 6 | 200 | **2.4** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 57 | *Archontophoenix alexandrae* | 12 | 4 | 250 | **3** | 90% | M | Nil | Garden bed | Nil | M | **A1** |
| | 58 | *Syagrus romanzoffiana* | 12 | 5 | 300 | **3.6** | 90% | M | Nil | Garden bed | Nil | M | **Z3** |
| | 59 | *Syagrus romanzoffiana* | 12 | 5 | 300 | **3.6** | 90% | M | Nil | Garden bed | Nil | M | **Z3** |
| | 60 | *Polyscias murrayi* | 9 | 5 | 200 | **2.4** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| **197L** | 61 | *Murraya paniculata* | 6 | 6 | 150 | **2** | 90% | M | Nil | Garden bed | Nil | M | **Z1** |
| | 62 | *Banksia serrata* | 3 | 3 | 150 | **2** | 80% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 63 | *Yucca sp.* | 3 | 1 | 90 | **2** | 90% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 64 | *Acacia sp.* | 6 | 5 | 250 | **3** | 70% | M | Nil | Garden bed | Nil | M | **Z1** |
| | 66 | *Banksia aemula* | 4 | 3 | 150 | **2** | 70% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 67 | *Banksia aemula* | 3 | 3 | 100 | **2** | 0% | O | Nil | Garden bed | Nil | L | **ZZ4** |
| | 68 | *Melaleuca armillaris* | 6 | 6 | 250 | **3** | 80% | M | Co-dominant | Garden bed | Nil | M | **Z1** |
| | 69 | *Banksia serrata* | 5 | 3 | 150 | **2** | 90% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 70 | *Banksia integrifolia* | 7 | 3 | 150 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 71 | *Banksia integrifolia* | 7 | 4 | 200 | **2.4** | 80% | M | Nil | Garden bed | Nil | M | **Z1** |
| | 72 | *Melaleuca armillaris* | 4 | 3 | 100 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 73 | *Acacia sp.* | 5 | 4 | 150 | **2** | 70% | M | Leaning | Garden bed | Nil | L | **Z1** |
| | 74 | *Melaleuca stypheliodes* | 5 | 4 | 150 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 75 | *Stenocarpus sinuatus* | 5 | 3 | 100 | **2** | 90% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 76 | *Ceratopetalum gummiferum* | 4 | 3 | 90 | **2** | 80% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 77 | *Archontophoenix alexandrae* | 5 | 3 | 200 | **2.4** | 80% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 78 | *Flindersia australis* | 6 | 5 | 250 | **3** | 70% | M | Cavity | Garden bed | Nil | M | **Z1** |
| **218L** | 79 | *Syzygium paniculatum* | 12 | 12 | 600 | **7.2** | 80% | M | Nil | Sealed surfaces | Adjacent structure | H | **A1** |
| | 80 | *Syzygium paniculatum* | 10 | 9 | 300 | **3.6** | 70% | M | Nil | Garden bed | Nil | M | **A1** |
| | 81 | *Syzigium paniculatum* | 5 | 4 | 200 | **2.4** | 80% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 82 | *Auranticarpa rhombifolia* | 7 | 3 | 100 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 83 | *Auranticarpa rhombifolia* | 7 | 3 | 100 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 84 | *Auranticarpa rhombifolia* | 7 | 3 | 100 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 85 | *Eucalyptus sp.* | 3 | 3 | 100 | **2** | 80% | S | Nil | Gravel | Nil | L | **Z1** |
| | 86 | *Eucalyptus sp.* | 3 | 3 | 100 | **2** | 80% | S | Nil | Gravel | Nil | L | **Z1** |
| | 87 | *Eucalyptus sp.* | 3 | 3 | 100 | **2** | 80% | S | Nil | Gravel | Nil | L | **Z1** |
| | 88 | *Eucalyptus sp.* | 3 | 3 | 100 | **2** | 80% | S | Nil | Gravel | Nil | L | **Z1** |
| | 89 | *Eucalyptus sp.* | 3 | 3 | 100 | **2** | 80% | S | Nil | Gravel | Nil | L | **Z1** |
| | 90 | *Grevillea robusta* | 7 | 4 | 200 | **2.4** | 80% | S | Nil | Gravel | Nil | M | **Z1** |
| | 91 | *Callistemon sp.* | 5 | 5 | 250 | **3** | 60% | M | Nil | Sealed surfaces | Adjacent structure | M | **Z4** |
| | 92 | *Lophostemon confertus* | 10 | 8 | 300 | **3.6** | 80% | M | Nil | Sealed surfaces | Adjacent structure | M | **A1** |
| | 93 | *Ficus microcarpa* 'Hillii' | 16 | 20 | 800 | **9.6** | 90% | M | Nil | Gravel | Nil | H | **AA1** |
| | 94 | *Eucalyptus saligna* | 20 | 16 | 800 | **9.6** | 70% | M | Bracket fungi, Cavity in major branch union | Gravel | Nil | H | **Z5** |
| | 95 | *Cupressus sp.* | 5 | 2 | 100 | **2** | 60% | M | Nil | Garden bed | Nil | L | **Z1** |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 96 | *Cupressus sp.* | 5 | 2 | 100 | **2** | 60% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 97 | *Callistemon sp.* | 5 | 6 | 250 | **3** | 80% | M | Nil | Garden bed | Adjacent structure | M | **Z1** |
| | 98 | *Lophostemon confertus* | 7 | 4 | 150 | **2** | 50% | M | Dieback | Garden bed | Nil | M | **Z4** |
| | 99 | *Banksia integrifolia* | 7 | 4 | 250 | **3** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 100 | *Ficus rubiginosa* | 5 | 3 | 100 | **2** | 90% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 101 | *Acacia elata* | 9 | 4 | 250 | **3** | 70% | M | Nil | Garden bed | Nil | M | **A1** |
| | 102 | *Banksia integrifolia* | 8 | 5 | 300 | **3.6** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 103 | *Flindersia australis* | 9 | 4 | 100 | **2** | 70% | M | Co-dominant | Garden bed | Nil | M | **A1** |
| | 104 | *Melaleuca stypheliodes* | 8 | 6 | 300 | **3.6** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 105 | *Flindersia australis* | 9 | 4 | 100 | **2** | 70% | M | Co-dominant | Garden bed | Nil | M | **A1** |
| | 106 | *Banksia integrifolia* | 8 | 5 | 300 | **3.6** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 107 | *Banksia integrifolia* | 5 | 4 | 200 | **2.4** | 60% | M | Leaning | Garden bed | Nil | L | **Z1** |
| | 108 | *Banksia integrifolia* | 8 | 5 | 300 | **3.6** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 109 | *Banksia integrifolia* | 8 | 5 | 200 | **2.4** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 110 | *Acacia elata* | 12 | 6 | 300 | **3.6** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 111 | *Stenocarpus sinuatus* | 5 | 3 | 150 | **2** | 90% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 112 | *Syncarpia glomulifera* | 7 | 3 | 200 | **2.4** | 80% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 113 | *Syncarpia glomulifera* | 7 | 3 | 200 | **2.4** | 80% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 114 | *Eucalyptus robusta* | 22 | 22 | 600 | **7.2** | 80% | M | Nil | Garden bed | Nil | H | **AA1** |
| | 115 | *Stenocarpus sinuatus* | 12 | 6 | 350 | **4.2** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 116 | *Flindersia australis* | 8 | 5 | 200 | **2.4** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 117 | *Brachychiton discolor* | 9 | 5 | 250 | **3** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 118 | *Polyscias murrayi* | 7 | 3 | 150 | **2** | 70% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 119 | *Acacia sp.* | 7 | 4 | 200 | **2.4** | 0% | O | Nil | Grass | Nil | L | **ZZ4** |
| | 120 | *Schefflera actinophylla* | 10 | 7 | 350 | **4.2** | 80% | M | Included bark | Garden bed | Nil | M | **Z3** |
| | 121 | *Glochidion ferdinandi* | 6 | 6 | 250 | **3** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| **169L** | 122 | *Podocarpus elatus* | 22 | 22 | 700 | **8.4** | 70% | M | Nil | Garden bed | Adjacent structure | H | **A2** |
| | 123 | *Syzygium sp.* | 4 | 2 | 80 | **2** | 80% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 124 | *Schefflera actinophylla* | 10 | 7 | 350 | **4.2** | 80% | M | Included bark | Garden bed | Nil | M | **Z3** |
| | 125 | *Elaeocarpus reticulatus* | 5 | 3 | 150 | **2** | 90% | M | Nil | Garden bed | Nil | M | **Z1** |
| | 126 | *Buckinghamia celsissima* | 5 | 3 | 100 | **2** | 90% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 127 | *Polyscias murrayi* | 7 | 3 | 150 | **2** | 70% | M | Nil | Garden bed | Nil | L | **Z1** |
| **260L** | 128 | *Lophostemon confertus* | 18 | 16 | 600 | **7.2** | 70% | M | Dieback | Garden bed | Nil | H | **A1** |
| | 129 | *Schefflera actinophylla* | 7 | 3 | 150 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z3** |
| | 130 | *Schefflera actinophylla* | 7 | 3 | 150 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z3** |
| | 131 | *Schefflera actinophylla* | 7 | 3 | 150 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z3** |
| | 132 | *Lophostemon confertus* | 20 | 16 | 600 | **7.2** | 80% | M | Nil | Garden bed | Adjacent structure | H | **AA1** |
| **213L** | 133 | *Magnolia grandiflora* | 8 | 7 | 300 | **3.6** | 70% | M | Nil | Garden bed | Nil | M | **A1** |
| | 134 | *Eucalyptus punctata* | 22 | 16 | 700 | **8.4** | 80% | M | Nil | Garden bed | Nil | H | **AA1** |
| | 135 | *Buckinghamia celsissima* | 5 | 3 | 100 | **2** | 90% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 136 | *Hymenosporum flavum* | 6 | 3 | 100 | **2** | 80% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 137 | *Buckinghamia celsissima* | 5 | 3 | 100 | **2** | 90% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 138 | *Eucalyptus robusta* | 20 | 14 | 500 | **6** | 80% | M | Nil | Garden bed | Nil | H | **AA1** |
| | 139 | *Casuarina cunninghamiana* | 22 | 10 | 450 | **5.4** | 60% | O | Dieback | Garden bed | Nil | H | **A2** |
| | 140 | *Casuarina cunninghamiana* | 22 | 14 | 500 | **6** | 60% | O | Failured central leader | Garden bed | Nil | H | **Z9** |
| | 141 | *Eucalyptus saligna* | 26 | 24 | 700 | **8.4** | 90% | M | Nil | Garden bed | Nil | H | **AA1** |
| | 142 | *Melaleuca quinquenervia* | 9 | 5 | 300 | **3.6** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 143 | *Banksia integrifolia* | 7 | 5 | 250 | **3** | 70% | M | Nil | Garden bed | Nil | M | **A1** |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 144 | *Polyscias murrayi* | 10 | 6 | 250 | **3** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 145 | *Eucalyptus robusta* | 14 | 9 | 300 | **3.6** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 146 | *Hymenosporum flavum* | 6 | 3 | 100 | **2** | 80% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 147 | *Banksia integrifolia* | 8 | 1 | 200 | **2.4** | 0% | O | Nil | Garden bed | Nil | L | **ZZ4** |
| | 148 | *Banksia integrifolia* | 12 | 9 | 350 | **4.2** | 90% | M | Nil | Garden bed | Nil | M | **A1** |
| | 149 | *Polyscias murrayi* | 6 | 2 | 60 | **2** | 70% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 150 | *Auranticarpa rhombifolia* | 9 | 7 | 300 | **3.6** | 80% | M | Nil | Garden bed | Adjacent structure | M | **A1** |
| | 151 | *Archontophoenix alexandrae* | 12 | 4 | 250 | **3** | 90% | M | Nil | Garden bed | Adjacent structure | M | **A1** |
| | 152 | *Auranticarpa rhombifolia* | 8 | 3 | 300 | **3.6** | 60% | M | Lopped crown, Epicormic growth | Garden bed | Adjacent structure | M | **Z9** |
| | 153 | *Elaeocarpus reticulatus* | 7 | 3 | 100 | **2** | 70% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 154 | *Banksia integrifolia* | 8 | 5 | 250 | **3** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 155 | *Brachychiton rupestris* | 7 | 4 | 500 | **6** | 70% | M | Nil | Garden bed | Nil | M | **A1** |
| | 156 | *Eucalyptus robusta* | 12 | 9 | 300 | **3.6** | 70% | M | Nil | Garden bed | Nil | M | **A1** |
| | 157 | *Eucalyptus saligna* | 7 | 5 | 200 | **2.4** | 80% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 158 | *Auranticarpa rhombifolia* | 7 | 4 | 150 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 159 | *Dicksonia antarctica* | 2 | 2 | 250 | **3** | 80% | M | Nil | Garden bed | Nil | L | **A1** |
| | 160 | *Dicksonia antarctica* | 2 | 2 | 250 | **3** | 80% | M | Nil | Garden bed | Nil | L | **A1** |
| | 161 | *Dicksonia antarctica* | 2 | 2 | 250 | **3** | 80% | M | Nil | Garden bed | Nil | L | **A1** |
| | 162 | *Dicksonia antarctica* | 2 | 2 | 250 | **3** | 80% | M | Nil | Garden bed | Nil | L | **A1** |
| | 163 | *Dicksonia antarctica* | 2 | 2 | 250 | **3** | 80% | M | Nil | Garden bed | Nil | L | **A1** |
| | 164 | *Eucalyptus sideroxyl* | 7 | 3 | 150 | **2** | 70% | S | Nil | Garden bed | Nil | L | **Z2** |
| | 165 | *Melaleuca stypheliodes* | 4 | 5 | 150 | **2** | 70% | M | Leaning | Garden bed | Adjacent building | L | **Z1** |
| | 166 | *Schefflera actinophylla* | 10 | 6 | 300 | **3.6** | 80% | M | Nil | Garden bed | Nil | M | **Z3** |
| | 167 | *Auranticarpa rhombifolia* | 6 | 3 | 150 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 168 | *Grevillea robusta* | 24 | 14 | 500 | **6** | 80% | M | Nil | Garden bed | Nil | H | **A1** |
| | 169 | *Polyscias murrayi* | 9 | 5 | 250 | **3** | 80% | M | Nil | Garden bed | Nil | M | **Z1** |
| | 170 | *Agonis flexuosa* | 14 | 12 | 500 | **6** | 70% | M | Nil | Garden bed | Nil | M | **A2** |
| | 171 | *Agonis flexuosa* | 9 | 8 | 350 | **4.2** | 70% | M | Nil | Garden bed | Nil | M | **A2** |
| | 172 | *Auranticarpa rhombifolia* | 8 | 3 | 150 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 173 | *Phoenix canariensis* | 10 | 7 | 600 | **7.2** | 90% | M | Nil | Garden bed | Nil | H | **A1** |
| **214L** | 174 | *Eucalyptus sp.* | 10 | 5 | 400 | **4.8** | 0% | O | Nil | Garden bed | Nil | M | **ZZ4** |
| | 175 | *Eucalyptus botryoides* | 24 | 12 | 600 | **7.2** | 80% | M | Nil | Garden bed | Nil | H | **AA1** |
| | 176 | *Syzygium sp.* | 9 | 6 | 250 | **3** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| **215L** | 177 | *Lophostemon confertus* | 12 | 12 | 500 | **6** | 80% | M | Nil | Garden bed | Nil | H | **AA1** |
| | 178 | *Glochidion ferdinandi* | 7 | 4 | 350 | **4.2** | 50% | O | Dieback, Failures | Garden bed | Nil | M | **Z4** |
| **217L** | 179 | *Ficus microcarpa 'Hillii'* | 16 | 14 | 500 | **6** | 90% | M | Nil | Garden bed | Adjacent structure | H | **AA1** |
| | 180 | *Banksia integrifolia* | 8 | 6 | 300 | **3.6** | 80% | M | Nil | Grass | Adjacent driveway | M | **A1** |
| | 181 | *Syzygium sp.* | 12 | 12 | 500 | **6** | 80% | M | Nil | Garden bed | Adjacent structure | H | **A1** |
| | 182 | *Glochidion ferdinandi* | 6 | 4 | 150 | **2** | 80% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 183 | *Glochidion ferdinandi* | 8 | 6 | 250 | **3** | 90% | M | Nil | Grass | Nil | M | **A1** |
| **275L** | 184 | *Lophostemon confertus* | 18 | 16 | 600 | **7.2** | 80% | M | Epicormic growth | Garden bed | Adjacent structure | H | **A1** |
| | 185 | *Glochidion ferdinandi* | 6 | 8 | 250 | **3** | 70% | M | Nil | Garden bed | Nil | M | **A1** |
| | 186 | *Pittosporum undulatum* | 5 | 3 | 200 | **2.4** | 70% | M | Nil | Gravel | Nil | L | **Z1** |
| | 187 | *Eucalyptus botryoides* | 16 | 12 | 400 | **4.8** | 80% | M | Nil | Gravel | Adjacent structure | H | **A1** |
| | 188 | *Pittosporum undulatum* | 5 | 3 | 200 | **2.4** | 70% | M | Nil | Gravel | Nil | L | **Z1** |
| | 189 | *Pittosporum undulatum* | 6 | 5 | 250 | **3** | 70% | M | Nil | Gravel | Nil | M | **A1** |
| | 190 | *Pittosporum undulatum* | 5 | 3 | 200 | **2.4** | 70% | M | Nil | Gravel | Nil | L | **Z1** |
| | 191 | *Eucalyptus botryoides* | 12 | 12 | 400 | **4.8** | 70% | M | Nil | Gravel | Nil | M | **A1** |
| | 192 | *Casuarina cunninghamiana* | 18 | 14 | 600 | **7.2** | 80% | M | Nil | Gravel | Nil | H | **AA1** |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 193 | *Syzygium sp.* | 7 | 5 | 300 | **3.6** | 90% | M | Nil | Garden bed | Nil | M | **A1** |
| | 194 | *Olea sp.* | 7 | 6 | 250 | **3** | 80% | M | Co-dominant | Gravel | Nil | M | **Z3** |
| | 195 | *Eucalyptus sp.* | 8 | 5 | 300 | **3.6** | 0% | O | Nil | Gravel | Nil | M | **ZZ4** |
| | 196 | *Pittosporum undulatum* | 5 | 3 | 200 | **2.4** | 70% | M | Nil | Gravel | Nil | L | **Z1** |
| | 197 | *Buckinghamia celsissima* | 5 | 4 | 100 | **2** | 90% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 198 | *Buckinghamia celsissima* | 5 | 4 | 100 | **2** | 90% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 199 | *Buckinghamia celsissima* | 5 | 4 | 100 | **2** | 90% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 200 | *Acacia falcata* | 8 | 7 | 250 | **3** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 201 | *Leptospermum petersonii* | 4 | 4 | 100 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 202 | *Pittosporum undulatum* | 4 | 3 | 100 | **2** | 80% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 203 | *Backhousia citriodora* | 5 | 3 | 100 | **2** | 90% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 204 | *Syzygium sp.* | 7 | 5 | 300 | **3.6** | 90% | M | Nil | Garden bed | Nil | M | **A1** |
| | 205 | *Allocasuarina torulosa* | 10 | 10 | 450 | **5.4** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 206 | *Allocasuarina torulosa* | 12 | 7 | 350 | **4.2** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 207 | *Allocasuarina torulosa* | 8 | 2 | 250 | **3** | 50% | M | Failures | Garden bed | Nil | L | **Z1** |
| | 208 | *Glochidion ferdinandi* | 10 | 10 | 400 | **4.8** | 70% | M | Nil | Garden bed | Nil | M | **A1** |
| | 209 | *Leptospermum petersonii* | 4 | 4 | 100 | **2** | 70% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 210 | *Leptospermum petersonii* | 4 | 4 | 100 | **2** | 70% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 211 | *Glochidion ferdinandi* | 5 | 4 | 150 | **2** | 90% | S | Nil | Garden bed | Nil | L | **Z1** |
| | 212 | *Allocasuarina torulosa* | 12 | 7 | 350 | **4.2** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 213 | *Callistemon sp.* | 10 | 12 | 450 | **5.4** | 70% | M | Failures | Garden bed | Nil | M | **A1** |
| | 214 | *Howea forsteriana* | 10 | 4 | 150 | **2** | 90% | M | Nil | Garden bed | Nil | L | **A1** |
| | 215 | *Callistemon sp.* | 6 | 5 | 150 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 216 | *Ceratopetalum gummiferum* | 5 | 4 | 100 | **2** | 70% | M | Nil | Garden bed | Nil | L | **Z1** |
| | 217 | *Acacia falciformis* | 16 | 9 | 350 | **4.2** | 90% | M | Nil | Garden bed | Nil | M | **A1** |
| | 218 | *Agonis flexuosa* | 9 | 9 | 350 | **4.2** | 80% | M | Nil | Garden bed | Nil | M | **A1** |
| | 219 | *Acacia sp.* | 7 | 7 | 150 | **2** | 80% | M | Nil | Garden bed | Nil | L | **Z1** |
| **165L** | 220 | *Gardenia sp.* | 4 | 5 | 180 | **2** | 90% | M | Nil | Garden bed | Nil | L | **A3** |

## Explanatory Notes

- **Measurements/estimates:** All dimensions are estimates unless otherwise indicated. Measurements taken with a tape or clinometer are indicated with a '*'. Less reliable estimated dimensions are indicated with a '?'.
- **Species:** The species identification is based on visual observations and the botanical name. In some instances, it may be difficult to quickly and accurately identify a particular tree without further detailed investigations. Where there is some doubt of the precise species of tree, it is indicated with a '?' after the name in order to avoid delay in the production of the report. The botanical name is followed by the abbreviation sp if only the genus is known. The species listed for groups and hedges represent the main component and there may be other minor species not listed.
- **Tree number:** relates to the reference number used on site diagram/report.
- **Height:** Height is estimated to the nearest metre.
- **Spread:** The average crown spread is visually estimated to the nearest metre from the outermost tips of the live lateral branches.
- **DBH:** These figures relate to 1.4m above ground level and are recorded in millimetres. If appropriate, diameter is measured with a diameter tape. 'M' indicates trees or shrubs with multiple stems.
- **Foliage Cover:** Percent of estimated live foliage cover for particular species range.
- **Age class:**

| | |
|---|---|
| **Y** | Young = recently planted |
| S | Semi-mature (<20% of life expectancy) |
| M | Mature (20-80% of life expectancy) |
| O | Over-mature (>80% of life expectancy) |

- **TPZ:** The Tree Protection Zone (TPZ) is the radial offset distance of twelve times the trunk diameter in meters.
- **Tree AZ:** See reference for Tree AZ categories in Appendix 3.
- **Significance:** A tree's significance/value in the landscape takes into account its prominence from a wide range of perspectives. This includes, but is not limited to neighbour hood perspective, local perspective and site perspective. The significance of the subject trees has been categorized into three groups, such as: High, Moderate or Low significance.

# 3.2 Proposed Planting

## Overall Planting Theme

The animal display within the Wildlife Retreat will showcase an Australian landscape, based on the sandstone woodland of Mosman and its harbour shoreline, home to a diverse and complex range of wildlife. The Retreat provides unique immersive wildlife experiences where guests will experience unprecedented close-up encounters with Australian animals, and enjoy tours and talks within an Australian landscape setting.

The plant community to be represented is the Sydney Sandstone gully Forest, generally occurring on sheltered sandstone slopes and associated gullies.

**Canopy species**

**Open-forest/woodland**:

| Botanical name | Common name |
|---|---|
| Angophora costata | Smooth-barked Apple |
| Corymbia gummifera | Red Bloodwood |
| Eucalyptus piperita | Sydney Peppermint |
| Eucalyptus. pilularis | Blackbutt |
| Syncarpia glomulifera | Turpentine |

**Tall open-forest:**

| | |
|---|---|
| Eucalyptus pilularis | Blackbutt |
| Eucalyptus saligna | Sydney Blue Gum |
| Syncarpia glomulifera | Turpentine |
| Eucalyptus agglomerata, E. deanei | Blue-leaved Stringybark/Mountain Blue Gum |

**Closed-forest:**

| | |
|---|---|
| Ceratopetalum apetalum | NSW Christmas Bush |
| Tristaniopsis laurina | River Gum |
| Allocasuarina littoralis/torulosa | Black She Oak/Forest Oak |
| Angophora floribunda | Rough-barked Apple |
| Ceratopetalum gummiferum. | NSW Christmas Bush |
| Eucalyptus punctata | Grey Gum |

**Associated understorey species:**

**Trees**

| | |
|---|---|
| Acacia floribunda Sally Wattle | |
| Acacia loggia | |
| Backhousia myrtifolia | Grey Myrtle |
| Ceratopetalum gummiferum | NSW Christmas Bush |
| Elaeocarpus reticulatus | Blueberry Ash |
| Glochidion ferdinandi | Cheese Tree |
| Pittosporum revolutum | Yellow Pittosporum |
| Pittosporum undulatum | Native Daphne |
| Stenocarpus salignus | Scrub Beefwood |

**Shrubs**

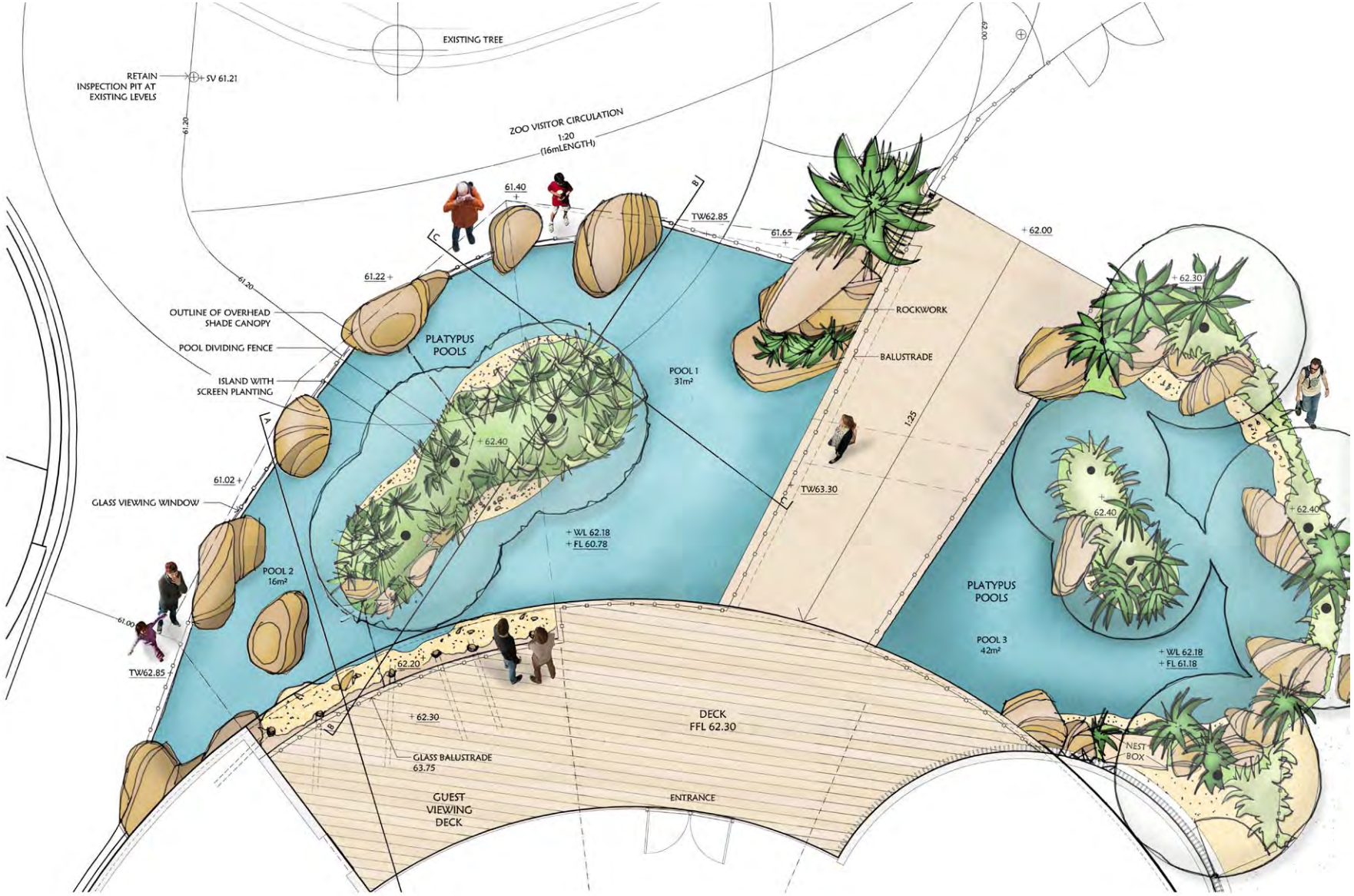
| | |
|---|---|
| Acacia terminalis | Sunshine Wattle |
| Banksia serrata | Old Man Banksia |
| Bossiaea lenticularis | Bossiaea |
| Callicoma serratifolia | Blackwattle |
| Clerodendrum tomentosum | Hairy Clerodendrum |
| Dodonaea triquetra | Common Hop Bush |
| Leptospermum polygalifolium | Yellow Tea-tree |
| Leucopogon juniperinus | Prickly Beard-heath |
| Leucopogon lanceolatus | Lance-leaf Beard-heath |
| Logania albiflora | Narrow-leaf Longania |
| Maytenus silvestris | Narrow-leaf Orange Bark |
| Notelaea longifolia | Large Mock Olive |
| Omalanthus nutans | Bleeding heart |
| Persoonia linearis | Narrow-leaved Geebung |
| Phebalium dentatum | Phebalium |
| Platysace linearifolia | Narrow-leaf Platysace |
| Polyscias sambucifolia | Elderberry Panax |
| Pomaderris elliptica | Smooth Pomaderris |
| Pomaderris ferruginea | Rusty pomaderris |
| Pultenaea daphnoides | Bush Pea |
| Pultenaea flexilis | Graceful Bush-pea |
| Zieria smith | Sandfly Zieria |

# 3.2 Proposed Planting

**Groundcovers**

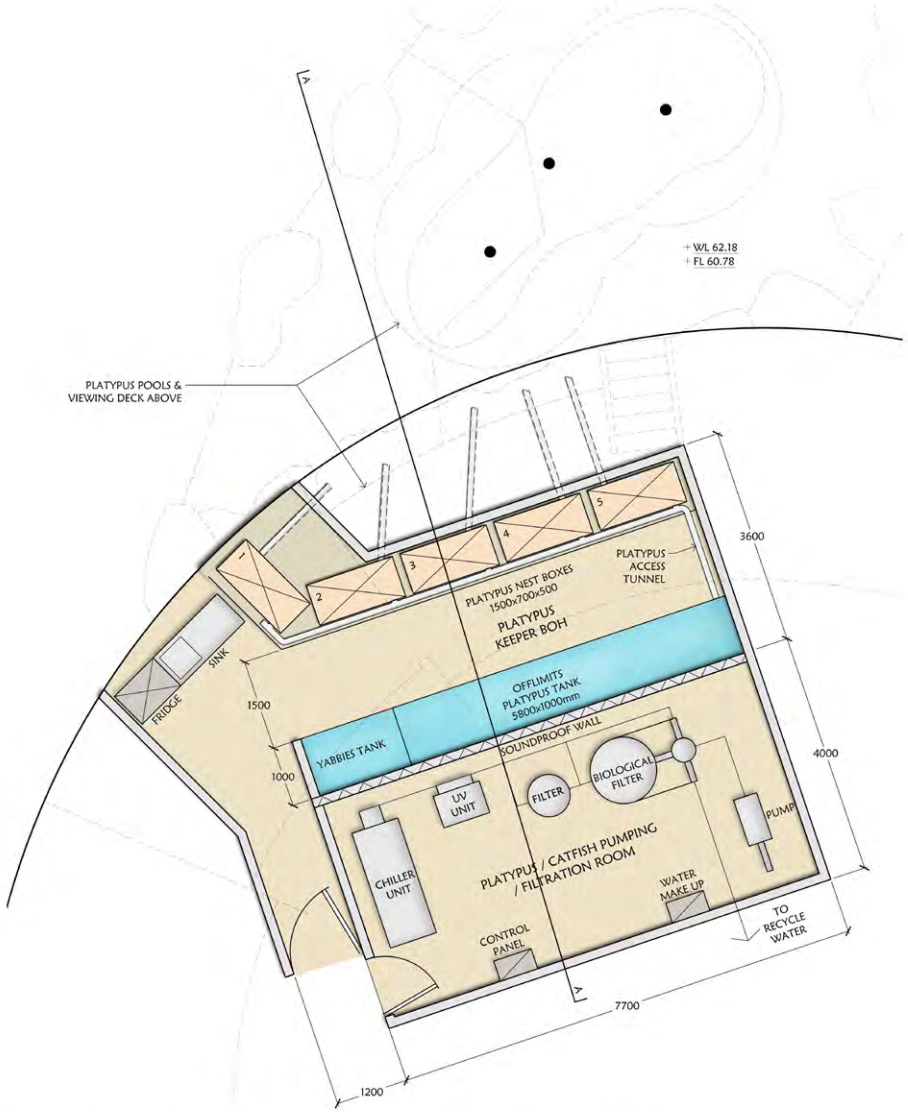
| | |
|---|---|
| Adiantum aethiopicum | Common Maidenhair |
| Blechnum cartilagineum | Gristle Fern |
| Cissus spp. | Native Grape, Water Vine |
| Dianelia caerulea | Paroo Lily |
| Doodia caudata | Small Rasp Fern |
| Entolasia marginata | Panic |
| Hibbertia dentata | Guinea Flower |
| Hymenophyllum cupressiforme | Common filmy-fern |
| Kennedia rubicunda | Running Postman |
| Liparis reflexa | Yellow Rock Orchid |
| Lomandra longifolia | Spiny-headed Mat-rush |
| Pteridium esculentum | Common Bracken Fern |
| Pyrrosia rupestris | Rock Felt-fern |
| Schoenus melanostachys | Black Bog-rush |
| Siegesbeckia orientalis | Indian Weed |

# 3.3 Guest Lodge & Platypus Pools




01 PLATYPUS EXHIBIT & GUEST VIEWING DECK
PLAN

# 3.3 Guest Lodge & Platypus Pools




02 PLATYPUS EXHIBIT - BACK OF HOUSE FACILITIES (UNDER DECK)
PLAN

**PLATYPUS POOLS**

*Exhibit area*

The captive environment must provide:

- for natural foraging behaviour through provision of live invertebrate food items
- secure ledges or banks for protected feeding, resting and grooming;
- a variety of natural objects such as logs, rocks, soil and plants;
- a large water body with adequate water flow and/or filtration to maintain quality;
- a water body surface area of at least 6m$^2$ and a depth of not less than 0.4m;
- water temperatures and air temperatures in nest boxes similar to those experienced in the wild (less than 25°C);
- tunnel systems modelled on wild tunnels, e.g. with respect to length and internal dimensions, to join the feed tanks, nest boxes and displays; and
- nests containing clean and dry nesting material.

*Aquatic Environment*

The aquatic environment must be maintained to a high standard of water clarity and cleanliness, with the tank water being changed frequently if recirculating filtration is not incorporated into the system. Filter inlets must be shielded to prevent platypus becoming trapped. All endeavours must be made to minimise the presence of electrical currents, excessive noise and vibration.

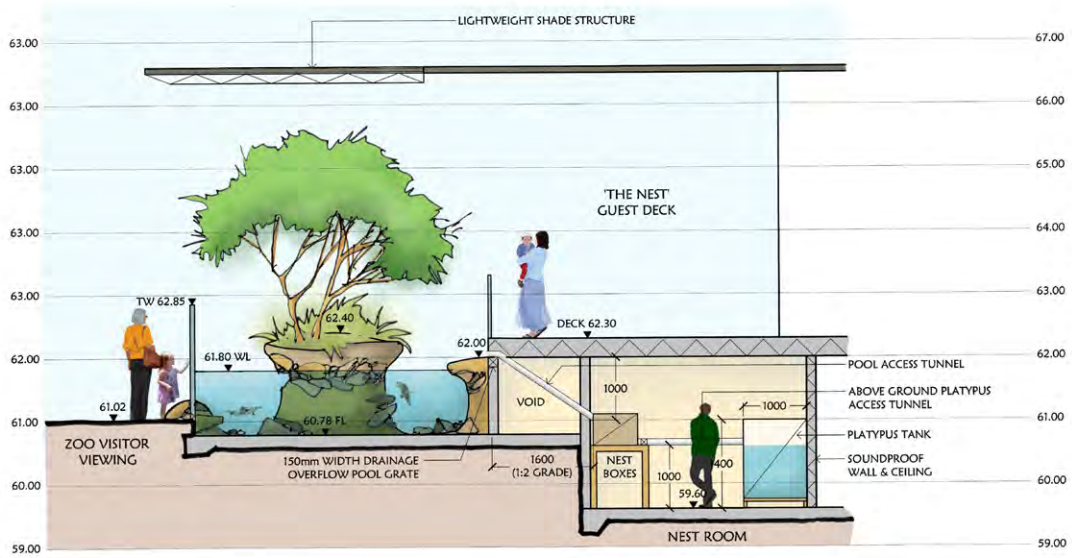
*Nests*

Nests to be located in soundproof room area and out of sunlight. Tunnels provided for platypus must be:

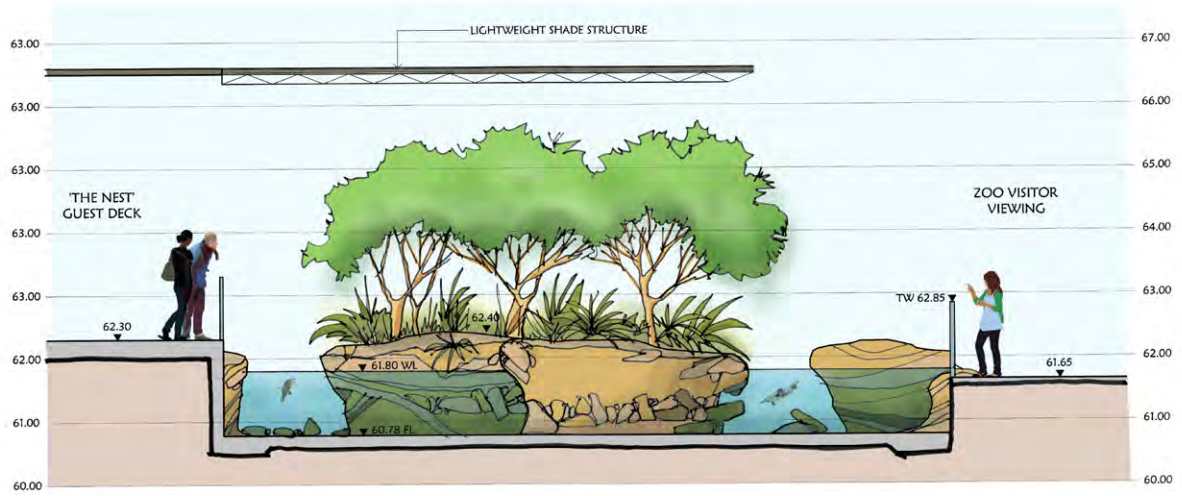
- at least 6cm high and 9cm wide internally;
- constructed of materials, such as wood or plastic, that minimise abrasion to feet, bill and fur while providing traction underfoot. Nest boxes would best be a box dug into the earth bank next to the exhibit for insulation purposes (note the temp specs in the standards), joined by a timber box shaped tunnel, 2-3 boxes per exhibit are desirable and each box would be 1.5m long x 70cm wide x 50cm deep. Ideally one will be further up the bank than the other to offer choice.
- all tunnels to have drainage holes for excess water.
- do not incorporate slope or tunnel angles greater than 30°C.

Refer: Standards for Exhibiting Australian Mammals in New South Wales P.01 & P.19

# 3.3 Guest Lodge & Platypus Pools

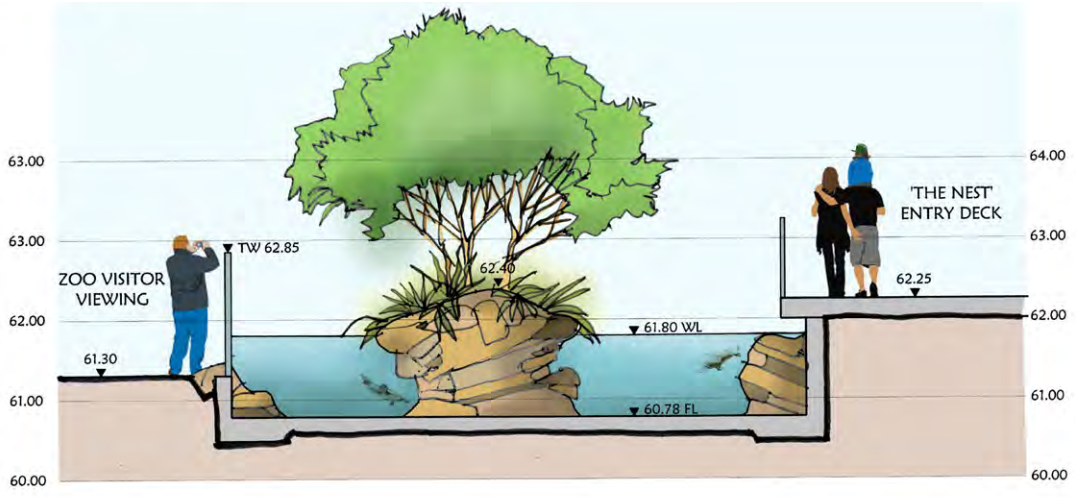



01 PLATYPUS EXHIBIT
SECTION A-A




02 PLATYPUS EXHIBIT
SECTION B-B

# 3.3 Guest Lodge & Platypus Pools




03 PLATYPUS EXHIBIT
SECTION C-C

# 3.4 Guest Lodge Fish Tanks

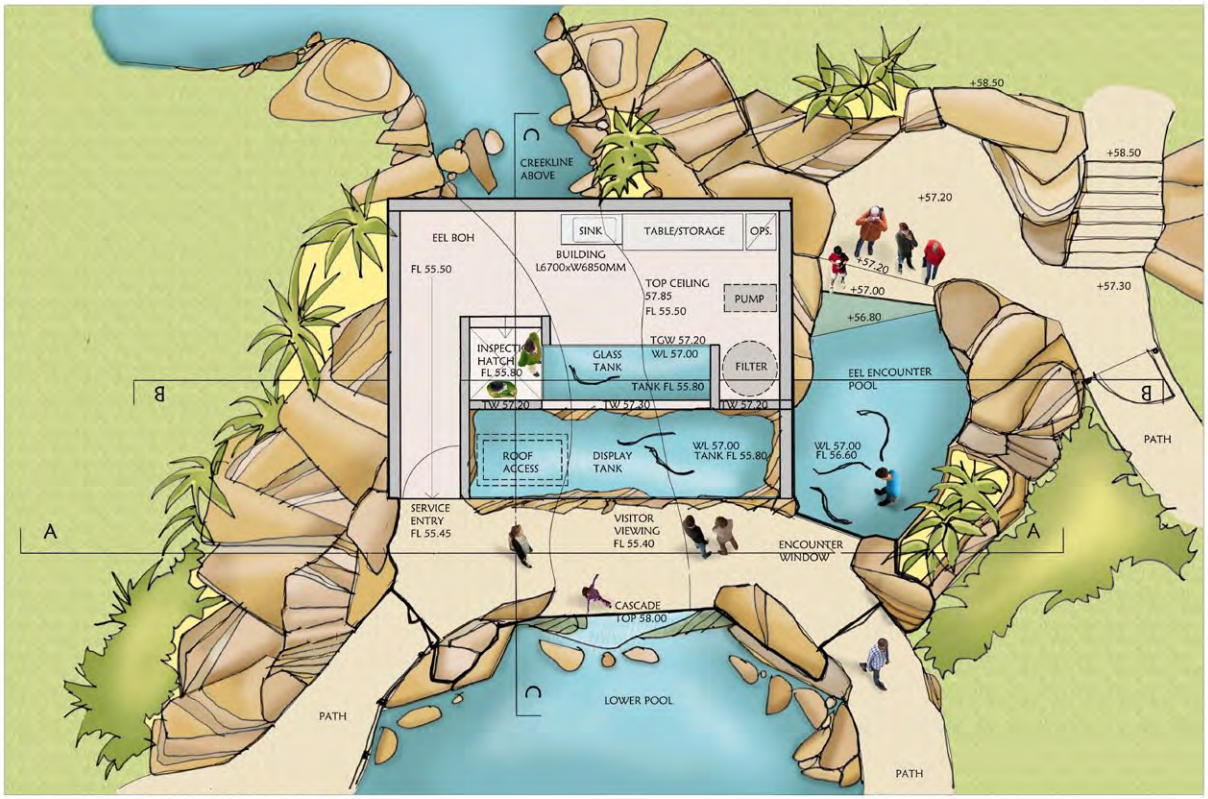
**GUEST LODGE RECEPTION FISH TANK**

*Fish Tank Display Area*

The Fish Tank is a unique exhibit area proposed for inside the Guest Lodge Reception area. General Recommendations include:

- The proposed fish tank display to be 3000mm length x 1000mm width x 120mmm height.
- Provide a flush finish with wall background to tank, tank to be accessed for maintenance and feeding from the rear.
- Create a creek floor environment for catfish species or others including a variety of natural objects such as logs, rocks and plants.
- Water supply and filtration to be provided from Platypus pump room.

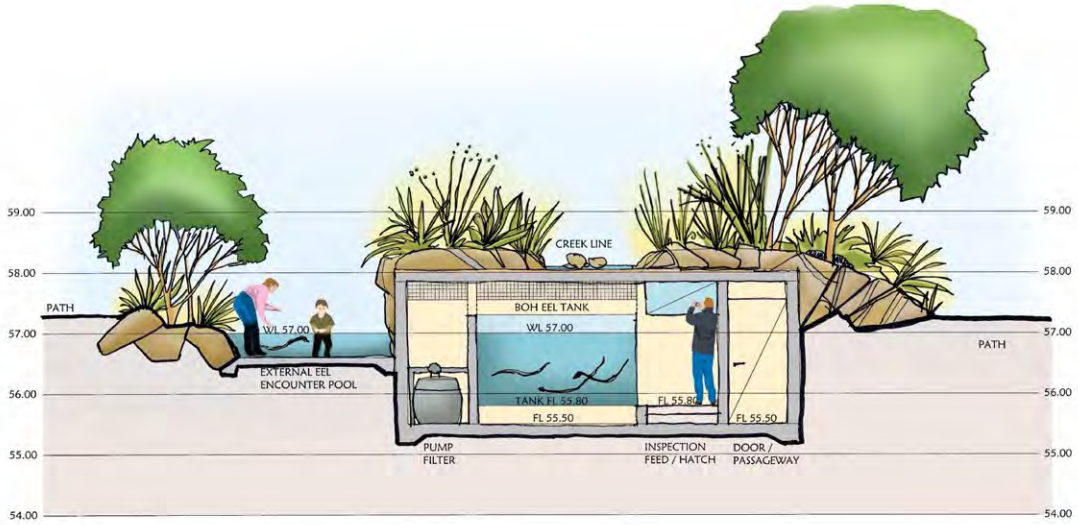
# 3.5 Eel Viewing Structure



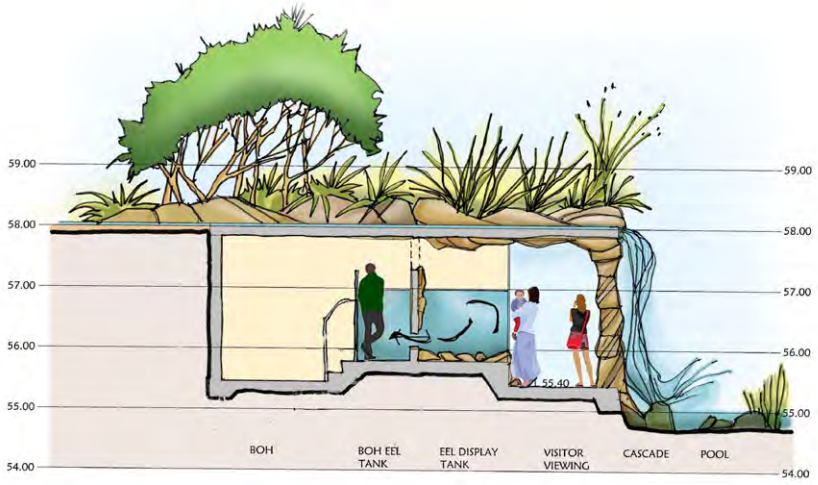

01 EEL EXHIBIT DISPLAY AREA
PLAN


02 EEL EXHIBIT
SECTION A-A FRONT

# 3.5 Eel Viewing Structure




03 EEL EXHIBIT
SECTION B-B REAR




04 EEL EXHIBIT
SECTION C-C

# 3.6 Eel Display Guidelines

*Overview*

Eels can be bred in both pond and recirculating tank systems in both freshwater and saltwater.

*Tank Design*

Tanks range in size depending upon the life stage grown in them and should be self-cleaning to expedite the removal of waste and to reduce mortality. The size of tanks for glass eels in a smaller unit usually ranges from 1 to 5 $m^3$ , and from 10 to 30 $m^3$ for ongrowers. Eels have a natural need to have mechanical contact with a solid substrate while resting (thigmotaxis). An alternative is for resting “hammocks” suspended within the water column if the tank base can not provide adequate resting area for all of the fish in the tank at resting time.

*Visitor Viewing*

Ensure a natural sandstone undercroft viewing area is achieved, with a water cascade defining the edge to the viewing area.

*Water Quality*

A basic intensive recirculation system should consist of a number of tanks (usually 1000-13000L in size) independently or group filtered by large biofilters, which are used to strip nitrogenous waste and nutrients from the water. Recirculation systems can incorporate UV and ozonation systems to disinfect water and protein skimmers to remove protein based wastes etc. After passing through the filters water is then recycled back to the tanks. The entire system should be contained within vermin proof, climate controlled housing.

The ideal temperature range for eels to remain healthy and to efficiently convert feed into growth is 23-28°C. Temperatures above optimal will result in lowered feeding and growth rates, stress and sometimes death.

High water quality should be maintained with a pH of around 7, alkalinity in excess of 20ppm, free of pesticides and contaminants, dissolved oxygen levels no lower than 3ppm and free ammonia levels less than 0.2mg/L.

*Back of House Facilities*

Requires a separate holding area using the water tank in the viewing undercroft, with a small service area and additional water tank in a central area of the Sanctuary. Restraint is provided by tank water level being 300mm below top of viewing glass.

*Other*

With the proposed structure beinh partly underground design should consider ‘confined spaces’ regulations and access to cleaning of the tanks.

Refer to http://www.dpi.nsw.gov.au/fisheries/aquaculture/publications/species-freshwater/eels-aquaculture-prospects for husbandry guides.

Ensure the encounter pool is of adequate size for the activity, and ensure safe passage of eel from the main visitor tank.

# 3.7 Nature's Beehouse


When we think of bees we usually think of swarms and busy hives, but most Australian native bees actually prefer to live alone.

*Successful Example*

The Australian National Botanic Gardens wants to help Canberra's native bee population feel more at home by providing a hotel equipped with individual "rooms". The bee hotel looks like a wooden bookcase filled with little rooms made from pieces of wood with holes, bamboo sticks, open flower stalks, mud bricks and curled bark.

*Overview*

The simplest bee homes are holes drilled in wood or made in clay. Type of nests could include blocks of word (hardwood & softwood) with various drilled holes at approximately 20mm centres, making holes smooth & blind (i.e. not right through the timber). Recommended sizes are 5mm hole at 120mm deep or 6.5mm holes at 150mm deep. Common practice for drilled bee nesting blocks is to use paper liners. These treated paper or cardboard tubes fit into holes in wood, clay or other mediums, or are sometimes used alone. The bees nest in the tubes (or 'straws'), which can be removed when the bees are mature. Once removed, they can be exchanged, brought to another site or stored in suitable safe containers to await hatching. Fresh liners in the holes then provide clean nest spaces for the following season.

*Housing Recommendations*

- Recycled materials, north facing slope for winter warming.
- Positioned and built so that it receives minimal direct summer sun.
- Parts of the wall protected by thick hedges of vegetation for privacy
- South, east and west sides of the wall protected by vegetation.
- North side may be exposed for warming by the sun and to allow visitors to approach and inspect the wall.

# 3.8 Koala Guidelines

*Overview*

Sufficient shelter must be provided to allow protection from wind, rain and extremes in temperature and allow sufficient access to shade during the hot periods of the day. Shelter can be provided in the form of partial or total overhead coverage by arranging trees in a compact pattern. The size and shape of enclosures for koalas must provide freedom of movement, both vertically and horizontally.

Whilst most of the animals in the Retreat are free-ranging, Koalas will be predominantly kept in their dedicated exhibit areas and taken to BOH offlimits for nighttime feeding.

*Mistakes to Avoid:*

- A poor example of Koala exhibit design is indicated in above left photo, where no foliage is provided for the Koalas, therefore eliminating any shade, protection or opportunities for privacy from public viewing.
- A minimum of two tree forks are required per Koala along with cross beams between perches, however care must be taken to also provide substantial foliage.
- Public should not have interaction without supervision.

V*egetation, Substrate & Design*

It is recommended to use a mixture of deadfall & live trees for the Koala enclosure to provide adequate coverage, protection and climbing/enrichment opportunity. A suitable tree species would be Tristania as Koala's are unlikely to feed on this species, therefore the foliage will continue to grow & provide adequate protection from wind, rain and sunshine.

A well drained, natural substrate such as a mixture of course sand, deco granitic, gravel and/or leaf litter is appropriate. Provide tall grasses to reduce an exposed bare unsightly ground. Concrete floors, due to their lack of naturalism, are unacceptable for exhibits, unless overlayed with above-mentioned natural elements.

*Recommendations*

- At all costs avoid the kangaroo on a stick, isolated on a single fork branch. Make it NATURAL!
- Mix of deadfall & live trees (Tristania spp.) to provide adequate foliage and shelter from wind and sun.
- Minimum of two tree forks per koala not less than 1.8 metres above ground and not closer than 0.9 metres to the next fork.
- All supports and branches must provide sufficient traction for koalas to climb easily and safely. Rough bark Eucalyptus species are preferred
- Enclosure substrate for exhibits must include sufficient ground layer vegetation to provide a naturalistic setting.
- Daily cleaning of exhibit enclosure areas.
- Well drained enclosure with readily cleanable substrate or be of a natural material that can be replaced to avoid accumulation of faeces and urine.
- Provide enrichment devices and automatic water drinkers per enclosure and good drainage.

*Back of House Facilities*

A simple design providing shelter from weather with free-flowing, fresh air and suitable climbing branches afore-mentioned. A totally roofed structure, constructed of chain or welded mesh of a size to ensure that koalas are not able to get any part of their body stuck.

*Restraint Fencing*

a) Suitable restraint fencing of 1200mm height.

* Refer to NSW Australian Mammal Exhibition Standards P.05 & P.19 for full details including spatial requirements.

# 3.9 Wallaby, Pademelon, Potoroo & Small Mammals Guidelines

*Overview*

The southern lower area macropod exhibit enclosure allows for a free-ranging experience for the Wallabies. The northern upper area allows Bridled Nail-Tail Wallaby, Red-legged Pademelon, Long-nosed Potoroo, Echidna, Bandicoot and Bettongs to forage and explore freely. Natural features should include rocks, grass tussocks, low plants/bushes, small shade trees, solid and hollow logs, dried grass, leaves to make nests, soil deep enough for burrowing species to make warrens.

Where visitors are permitted to go into an enclosure with macropods, there must be an area, which at least meets the minimum size requirements for holding yards and which is designated off limits (BOH) to the visitors so the enclosed macropods may escape unwanted visitor attention. Provide nesting houses for Echidna's and Bandicoots located in quiet areas along fencelines or hidden from public view.

*Mistakes to Avoid:*

- Do not rely on built structures, use natural materials, even as restraints.
- Provide adequate shelter from prevailing weather and well disguised browse feeders/automatic water drinkers.

*Vegetation, Substrate & Design*

Thick native scrubland or dense forested undergrowth on the edges where tunnels can be made through long grasses & shrubs. A well drained, natural substrate such as a mixture of, deco granitic, gravel and/or forest mulch is appropriate with sufficient grasses & groundcovers arranged to provide numerous pathways and hiding loci, which serve to prevent stereotypic behaviour.

Groundcovers and other sight barriers provided so that individuals can isolate themselves visually from the viewing public and other macropods in the enclosure. Compacted inert material substrate, which is non-abrasive to macropod feet. Sufficiently soft substrate/bedding is required for 'hip-hole' resting areas. Concrete is only acceptable for short term holding/hospital enclosures.

*Recommendations*

- All animals must be provided with a means of shelter from wind, rain and extremes of temperature and sunlight such as through groundcovers or external plantings.
- Suitable ground cover and/or other sight barriers must be provided so that individuals can isolate themselves visually from the viewing public and other macropods sharing the enclosure.

*Back of House Facilities*

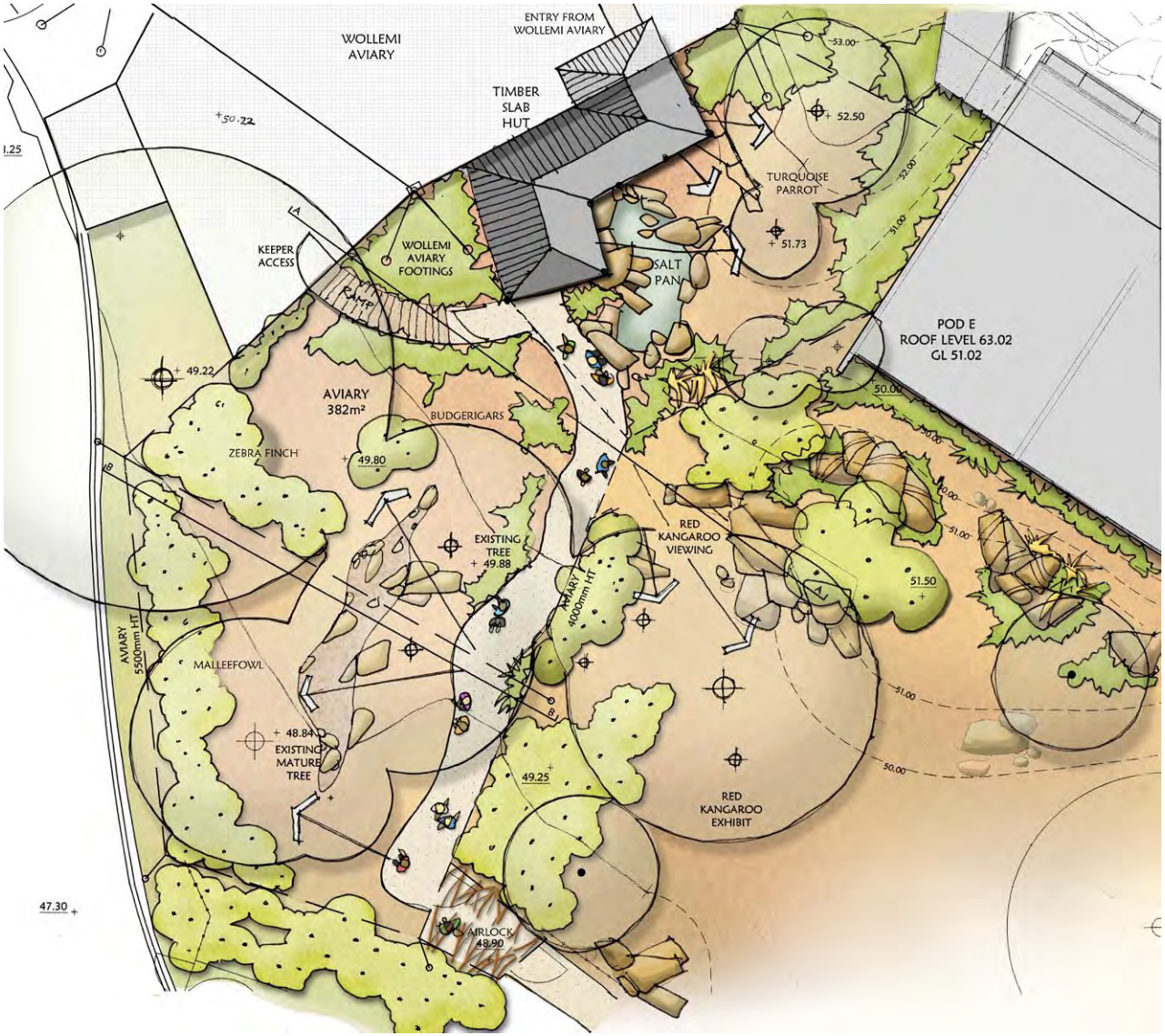
BOH facilities are required for the Wallabies. Yards should be as long as possible to allow for feeding, stretching out and exercise. The size of holding yards must not fall below one third of the minimum requirements for display enclosures, refer to NSW guidelines. Housing should be as natural as possible, predator proof, escape proof and provide an appropriate and comfortable environment.

*Restraint Fencing*

- Fences 1800mm high with 500mm overhang outwards and 1000mm flat outside to prevent dogs & foxes (dog, fox & vermin proof fencing).
- Do not incorporate obstacles protruding out from the fence line (including support poles) into the enclosure.
- Changes in direction of fenceline to be a smooth as possible.
- Avoid sharp projections or corners and preferably fence straining wires should be on the outside of the fence.
- Provide screening with bushes, hessian or shade cloths.

* Refer to NSW Australian Mammal Exhibition Standards P.12 & P.19 for full details including spatial requirements.

# 3.10 Lower Australia Aviary Structure




*Overview*

The walk-through Aviary is proposed to be 380m$^2$ and will house the Turquoise Parrot, Zebra Finch, Malleefowl, Budgerigars and other ground dwelling birds.

*Landscape Journey*

Emerge from Wollemi Gorge Aviary, lead to Red Kangaroo through Themed Bush Hut and Lower Australia Aviary. Transition from Wollemi Gorge Aviary landscape to open, dry mallee landscape of the Red Kangaroo Exhibit. Themed Bush Hut with sheltered viewing area provides views to Turquoise Parrot and aviary birdlife. Shallow salt pan near entry, dry creek bed toward exit.

*Aviary Structure*

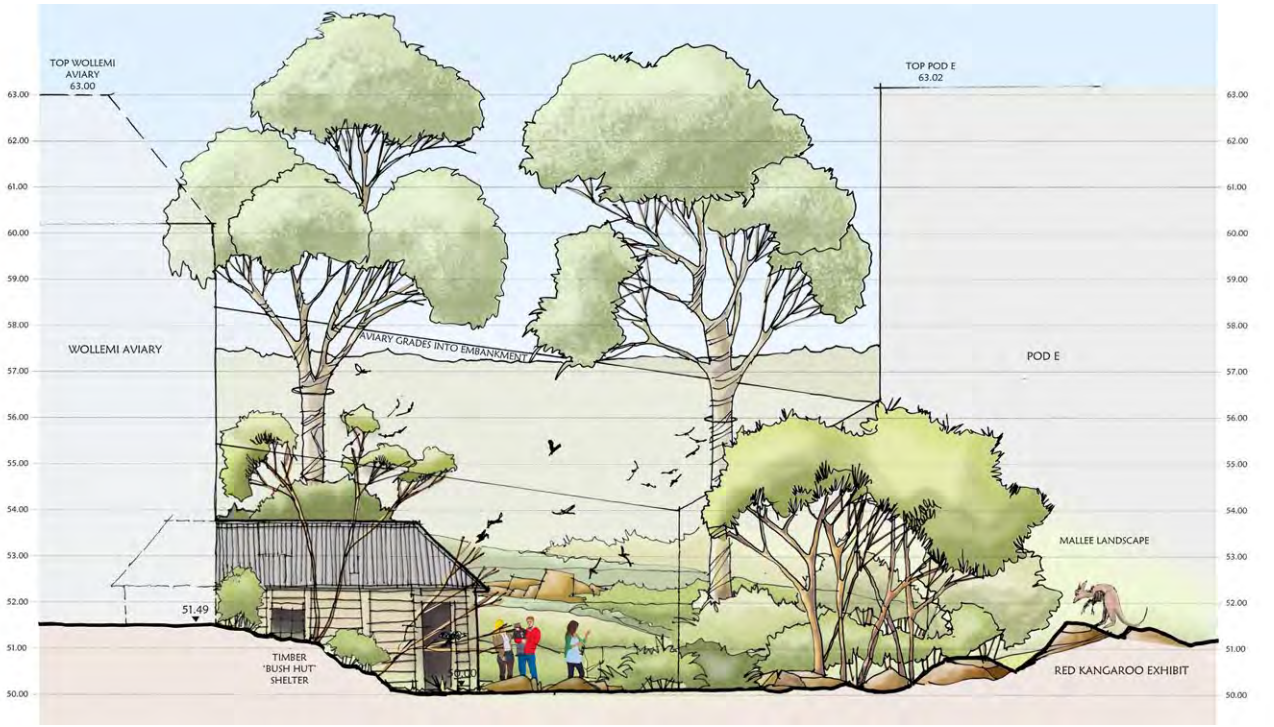
The preference is for black nylon with stainless steel interwoven wire - lightweight, high strength netting. The benefit is that the mesh itself is unobtrusive visually, and its lightweight necessitates smaller posts. Steel wire provides protection from external scavenging and/or predatory birds. The netting is easy to install and remove for maintenance Alternatives include mesh membrane, SS wire mesh, zoo mesh. Grades into embankment at northern edge, up to 5.5m height at lower / southern edge. Bridging between the larger 12m height POD E and Wollemi Aviaries. Provide Adjustable Net rings to allow existing trees to emerge through aviary structure Ensure no gaps - animal containment and to prevent access. Protection at ground level from predators, including underground mesh.

*Vegetation & Habitat, Planting*

Mallee woodlands and shrub lands. Retain existing mature trees and provide suitable plantings of Acacia, Hakea, Melaleuca and groundcovers & grasses. Enable areas of clear line of sights for bird flight. Soften Wollemi Aviary edge and footings with planting.

* Refer to Taronga Zoo Aviculturist for specific bird species requirements and NSW Animal Welfare Code of Practice No 4.

# 3.10 Lower Australia Aviary Structure




*Aviary Bird Housing Guidelines*

Each species should be accommodated according to its specific needs however general recommendations include:

- protection from the extremes of climate including flood, fire and safety from predators.
- ability to escape from, or avoid distress caused by other birds, animals and humans.
- protection of food and water containers from contamination or from rain or direct sunlight.
- sufficient space, perches, nesting areas and/or feed and water stations to meet the needs of all the birds in the cage or aviary.
- nesting sites and materials appropriate for the species for breeding purposes where intended.
- insulation or heating may be needed, where birds are likely to be distressed by heat some cooling mechanism should be provided.
- roosting sites, perches or hiding areas made of natural materials in the manner and positions most appropriate for the species. Perches should be of varied size and shape. Metal or plastic perches are not suitable.