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# FORESTWAY SHOPPING CENTRE WARRINGAH ROAD & FOREST WAY, FRENCHS FOREST

# ARBORICULTURAL IMPACT ASSESSMENT

PREPARED FOR:

**ARE Chemin De La Foret Pty Ltd**

PREPARED BY:


**ANDREW MORRISON**
**Ass. Dip. Horticulture**
**Dip. Hort, Arboriculture**
**Dip. Hort, Landscape Design**
**Cert III Landscape Construction**
**IACA, ISA, LGTRA, AILDM**


INSTITUTE OF AUSTRALIAN CONSULTING ARBORICULTURISTS
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| *date* | *revision* | *prepared* | *checked* |
|---|---|---|---|
| 31/08/18 | Issued Development Application | GO | AM |

# Executive Summary

This report was commissioned by ARE Chemin De La Foret to accompany their Development Application within the Northern Beaches Council area at Warringah Rd & Forest Way, French Forest. The aim of this report is to provide an assessment of the impacts of the proposed development on twenty-two trees in accordance with *AS4970 – 2009 Protection of trees on development sites* ('the standard').

This report collates and presents information collected by Gorka Ojeda on the 29/06/18. The data collected is located at **7. Tree Survey Table** (page 13) also see **8. Tree Survey Table Notes** (page 16) for notes relating to tree survey table.

Generally the site's vegetation was observed to have a majority native tree canopy, with an exotic shrub midstorey and paved ground. The existing surveyed trees are shown at **9. Tree Location Plan** (page 20).

The proposed project will involve the redevelopment of the Forestway Shopping Centre into a 6 level development with associated basements, buildings, driveways, car parking, paths, gardens, turf, paving and retaining walls. This will involve the demolition of existing structures and regrading site levels through excavation, cutting and filling of soil on site. The extent of site works is also illustrated at **9. Tree Location Plan** (page 20).

The matrix below gives a brief overview summary of tree significance and level of encroachment from the proposed development of numbered trees.

| | **ENCROACHMENT WITHIN TPZ**<br>Numbering of trees as shown on Tree Location Plan | | | | |
|---|---|---|---|---|---|
| **TREE LANDSCAPE SIGNIFICANCE** | | **No Impact** | **Minor Encroachment** (<10% of TPZ) | **Major Encroachment** (>10% of TPZ) | **Within Development Footprint** |
| | **High** | - | - | - | 3 & 6 |
| | **Medium** | 19 & 20 | - | - | 2, 4, 8, 9, 10, 11, 13, 17, 18, |
| | **Low** | 22 | - | 21 | 1, 5, 7, 12, 14, 15 & 16 |
| | **Total Number of trees** | **3** | **0** | **1** | **18** |

In consideration of the data collected recommendations are provided for the removal or retention of trees including specific tree protection measures required to reduce the anticipated impacts from the proposed construction on those trees proposed to be retained. This report specifically recommends:

- The removal of Tree No.'s 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 & 18 if the development is approved as there is an unavoidable major encroachment into the tree protection zones.
- The replacement planting of at least 18 locally native or deciduous canopy trees shall be installed in 45L pot size to offset the loss of trees on site. Provision of adequate soil volume on trees growing over slabs must be provided to allow the trees to attain their full size and provide benefit.

- The retention of Tree No.'s 18, 19 & 22. The construction will not impact these trees.
- The retention of Tree 21. This is contingent on the redesign of the 'Covered Walkway' to be removed from the TPZ of the tree in the plans.
- Tree sensitive construction measures must be implemented if works are to proceed within the TPZ of any tree to be retained as prescribed by the Australian Standard AS4970-2009 Protection of trees on development sites. Specifically the final cut of roots should result in a clean cut, using appropriate tools. Severing roots by earthmoving equipment is unacceptable.
- Pruning of branches should comply with Australian Standard No *4373 -2007 - Pruning of Amenity Trees*. Branch reduction should be made to internal lateral branches or stems which are at least 1/3rd of the diameter of the branch being cut – or – removed at the branch collar, consistent with AS *4373 -2007; Sections 6.4 a) & b) and 7.3.* Deadwooding should be carried out concurrently.
- This arboricultural assessment should be reviewed upon the preparation of stormwater or revised architectural plans.
- Project Arborist supervision is required for all works located within the TPZ of all retained trees.
- A minimum AQF Level 5 Project Arborist shall be engaged to certify the tree protection works in accordance with the hold points provided at **6.3. Hold Points** (page12).
- For additional tree protection notes see **10. General Tree Protection Notes** (page 22).

# Table of Contents

# 1. Introduction

This report was commissioned by ARE Chemin De La Foret to accompany their Development Application within the Northern Beaches Council area at Warringah Rd & Forest Way, French Forest. The aim of this report is to provide an assessment of the impacts of the proposed development on twenty-two trees in accordance with *AS4970 – 2009 Protection of trees on development sites* ('the standard').

This report collates and presents information collected by Gorka Ojeda on the 29/06/18. The data collected is located at **7. Tree Survey Table** (page 13) also see **8. Tree Survey Table Notes** (page 16) for notes relating to tree survey table.

# 2. Methodology

## 2.1. Limitations

Care has been taken to obtain all information from reliable sources. All data has been verified as far as possible. However Andrew Morrison - Consulting Arborist can neither guarantee nor be responsible for the accuracy of information provided by others. Unless stated otherwise:

- Information contained in this report covers only the tree/s examined and reflects the health and structure of the tree at the time of inspection. The documented, observations, results, recommendations and conclusions given may vary after the site visit due to environmental conditions. Liability will not be accepted for damage to person or property as a result of natural processes, unforeseeable actions or occurrences.
- Observations recorded for trees located within adjacent properties have been made without entering that property. Deciduous trees inspected during winter and all trees obscured by other vegetation are not able to be properly assessed. As a result measurements for these trees are estimated. Similarly these trees were not subject to a complete visual inspection and defects or abnormalities may be present but not recorded.
- The inspection was limited to visual examination from the base of the subject tree without dissection, excavation, probing or coring (unless specifically noted otherwise).
- There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the subject tree may not arise in the future.

No structural foundation design, stormwater or hydraulic plans have been supplied.

## 2.2. Site Inspection

A visual inspection of the tree/s was performed from ground level, data collected includes:

- Genus, Species, Common Name;
- Height, Width, DBH (Diameter at Breast Height), DRB (Diameter above Root Buttress);
- Age, Health & Vigour;
- Significance, Amenity and Ecological Value;
- Form and Structural Condition;

- Visible Defects or Evidence of Wounding.

## 2.3. Measurement

- Tree locations are supplied by client on the survey plan or triangulated using a measuring tape.
- Diameter at breast height (DBH) and Diameter above Root Buttress (DRB) are measured using a diameter tape.
- Height is measured using a clinometer or Nikon *Forestry Pro*.
- Canopy width is estimated using a measured stride paced out on site.
- Structural Root Zone (SRZ) and Tree Protection Zone (TPZ) radii are calculated (in accordance with *AS 4970-2009*).
- Development impact/setback is measured from the nearest face of the trunk to the face of the structure in Auto CAD using the perpendicular distance function.

## 2.4. Recording Data

Data collected is collated in the tree survey table located at **7. Tree Survey Table** (page 13). The tree survey table contains abbreviations for terms describing the tree's characteristics; explanatory notes pertaining to these are located at **8. Tree Survey Table Notes** (page 16).

The physical data for tree locations, crown width and DRB is schematically described in **9. Tree Location Plan** (page 20).

## 2.5. Reference Documents

The report was written in coordination with:

- Survey Plan showing select Features and Levels prepared by Real Serve Pty Ltd Sheets 1 to 6, dated 03/05/18 and 11/05/18.
- DA Architectural Drawings Nos ATP-101-3, 105, 5001-2, 05201, 20001-6, 40001 50001-2 & 70002, prepared by Buchan, dated 18/07/18.
- Landscape Plan Concept Report pages 6, 10, 12 & 21 prepared by Place Design Group, dated August 2018.
- The Australian Standard for the Protection of Trees on Development Sites (AS 4970 – 2009).

## 2.6. Council Tree Preservation Order

The property is in the recently formed Northern Beaches Council LGA. During the current transition phase, the planning controls from the former Warringah Council apply.

The Warringah Council DCP 2011 defines a Tree as being 'all trees'. Specifically, Tree DAs are required for:

- Removal or cutting down of any tree over 5 meters in height;
- Pruning of more than 10% of a tree canopy
- The removal of Bushland

Some exceptions apply for certain tree species,

## 2.7. Determining a tree's significance

The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. When determining a tree's significance within the landscape context, the following questions are asked of each tree. Significance may be expressed in increments of High, Medium or Low. For a High rating the majority (≥4) of the answers will be yes; For a Medium-High rating 3.5 of the answers will be yes; for a Medium rating half (=3) of the answers will be yes; for a Low-Medium rating 2.5 of the answers will be yes; and for the Low rating the minority of answers will be yes (≤2).

1. Is the tree a locally native remnant; an endangered species; a part of an endangered ecological community; or does the tree provide critical habitat for an endangered species?

2. Is the tree of botanical interest; Is it included in a significant tree register or listed as a heritage item under the Federal State or Local Regulations?

3. Is the tree visually prominent in the locality?

4. Is the tree well structured?

5. Is the tree in good health and/or does it display signs of good vigour?

6. Is the tree typically formed for the species?

7. Is the tree currently located in a position that will accommodate future growth?

# 3. Observations

## 3.1. Site Description

The site is located between Forest Way to the East, Russell Avenue to the North, Grace Avenue to the west and the Frenchs Forest Public School grounds to the South and is formed of commercial areas and buildings occupied by various tenants.

The block currently contains detached commercial buildings with associated car parking facilities, ramps, pedestrian corridors, loading docks, driveways, paths, turf areas and gardens. Some structures along Forest Way have been recently demolished and a construction site established.

Northerly aspect with slope less than 5˚.

Land zoning: B2 Local Centre.

The property is not Heritage listed and contains no Heritage Items.

## 3.2. Soil Landscape Map

The soils in this area are from the Lucas Heights soil landscape group [3]. They are characterised by moderately deep 50-150 cm hard setting yellow podzolic soils and yellow soloths, with yellow earths on the outer edges.

Generally the landscape is characterised by gently undulating crests and ridges on plateau surfaces of the Mittagong formation with alternating bands of shale and fine-grained sandstones. There is local relief to 30 m with slope gradients of <10%, and rock outcrops are absent [3].

These soils are limited by low soil fertility, low available water capacity and stony soil. The critical soil characteristics of this soil type for trees growing on this site include low fertility, and low water capacity [3].

## 3.3. Native Vegetation Map

Sandstone Ridgetop Woodland ecological community[13, 14] is dominated by *Corymbia gummifera* and *Eucalyptus sclerophylla* with *Banksia serrata* frequently present at lower abundance. A variety of other tree species occur more sporadically, including *E. punctata, E. oblonga*, *E. piperita, Angophora bakerii* and *Angophora costata*.

A diverse array of shrub species is always present, although depending on the time of the last fire a shrub stratum may not be fully developed. Shrub species frequently recorded include *Banksia spinulosa* var. *spinulosa, Isopogon anemonifolius, Leptospermum trinervium, Phyllanthus hirtellus, Dillwynia retorta* and *Eriostemon australasius* subsp. *australasius*. [13, 14]

The ground stratum is similarly diverse and features species such as *Lomandra obliqua*, *Entolasia stricta*, *Cyathochaeta diandra*, *Dampiera stricta* and *Stipa pubescens*. [13, 14]

There appears to be no species representative of this vegetation community located on this site.

## 3.4. Summary of site inspection data

Generally the site's vegetation was observed to have a majority native tree canopy, with an exotic shrub midstorey and paved areas. The existing surveyed trees are shown at **9. Tree Location Plan** (page 20).

## 3.5. Summary of Proposed Development

The proposed project will involve the redevelopment of the Forestway Shopping Centre into a 6 level development with associated basements, buildings, driveways, car parking, paths, gardens, turf, paving and retaining walls. This will involve the demolition of existing structures and regrading site levels through excavation, cutting and filling of soil on site. The extent of site works is also illustrated at **9. Tree Location Plan** (page 20).

### 3.6. Tree significance and encroachment matrix

The matrix below gives a brief overview summary of tree significance and level of encroachment from the proposed development of numbered trees.

| | ENCROACHMENT WITHIN TPZ<br>Numbering of trees as shown on Tree Location Plan | | | | |
|---|---|---|---|---|---|
| TREE LANDSCAPE SIGNIFICANCE | | **No Impact** | **Minor Encroachment** (<10% of TPZ) | **Major Encroachment** (>10% of TPZ) | **Within Development Footprint** |
| | **High** | - | - | - | 3 & 6 |
| | **Medium** | 19 & 20 | - | - | 2, 4, 8, 9, 10, 11, 13, 17, 18, |
| | **Low** | 22 | - | 21 | 1, 5, 7, 12, 14, 15 & 16 |
| | **Total Number of trees** | **3** | **0** | **1** | **18** |

# 4. Discussion

### 4.1. Trees with a Major TPZ Encroachment

The proposed construction encroaches within the TPZ by more than 10% or is within the SRZ.

Tree 21 is a council owned tree located 0.9m from the proposed New Covered Walkway south of Sorlie Place, providing an unsustainable major 25.1% encroachment within the TPZ and encroachment within the SRZ. This tree is considered to be of low significance having a previously snapped main leader however this tree is located on council land and should be retained and protected unless Council gives permission for removal of the tree.

Encroachment into the TPZ will be at both ground level and canopy level as pruning of small diameter growth will be needed to give clearance to the awning above the walkway.

Advice has been received that the covered walkway around the tree will be removed from the next DA revision. This should be confirmed.

### 4.2. Trees within the development footprint

- Tree 1 is located on an elevated garden bed at RL149.65 within the proposed footpath and garden areas on the Southeast corner of the development. These garden areas and footpath are proposed to be excavated to FFL 148.17 and will require removal of the tree. This tree is considered to be of low significance and should not be considered a constraint on the development.

- Trees 2, 13, 17 & 18 are located within the proposed retaining wall for the basement car park. This trees are considered to be of medium significance and are suitable for retention, however extensive redesign of the proposed basement footprint would be required to retain these trees. They cannot be retained if the development is approved in its current form.

- Trees 3 & 6 are located within the footprint of the proposed basement retaining wall and car park ramp. These tree are considered to be of high significance and suitable to be retained and protected, however extensive redesign of the proposed basement and ramp footprints would be required to retain these trees. They cannot be retained if the development is approved in its current form.

- Tree 4 is located on an elevated garden bed at RL149.20 within the proposed footpath south of the basement ramp entrance. This footpath is proposed at FFL 148.17 and will require removal of the tree. This tree is considered to be of medium significance and is suitable for retention, however extensive redesign of the proposed basement footprint would be required to retain this tree. It cannot be retained if the development is approved in its current form.

- Trees 5 & 7 are located on an elevated garden bed at RL149.06 within the proposed crossover to the basement ramp. This crossover is proposed to be at a FFL 147.68 and will require removal of the trees. These trees are considered to be of low significance and should not be considered a constraint on the development.

- Tree 8 is located on an elevated garden bed at RL148.99 within the proposed garden area north of the crossover for the basement entrance. This garden area is proposed at FFL 147.68 and will require removal of the tree. This tree is considered to be of medium significance and is suitable for retention, however extensive redesign of the proposed basement footprint would be required to retain this tree. It cannot be retained if the development is approved in its current form.

- Trees 9, 10 & 11 are located within the proposed footpath. These trees are considered to be of medium significance and are suitable for retention however extensive redesign of the proposed footpath layout would be required to retain these trees. They cannot be retained if the development is approved in its current form.

- Trees 12, 14, 15 & 16 are located within the footprint of the proposed retaining wall for the basement carpark. These trees are considered to be of low significance and should not be considered a constraint on the development.

## 4.3. Other Tree Comments

- Trees 19, 20 & 22 are Council owned trees located in positions that will allow their retention without impact from the proposed development.

- The replacement planting recommended to offset the loss of trees on site should be supported by design measures to compensate for the limited garden surface area available. Consideration should be given to providing sufficient suitable soil volume underneath hardstand by the use of planting vaults or similar to allow the trees to attain their full size and usefulness without ongoing maintenance costs.

# 5. Recommendations

In consideration of the data collected recommendations are provided for the removal or retention of trees including specific tree protection measures required to reduce the anticipated impacts from the proposed construction on those trees proposed to be retained. This report specifically recommends:

- The removal of Tree No.'s 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 & 18 if the development is approved as there is an unavoidable major encroachment into the tree protection zones.
- The replacement planting of at least 18 locally native or deciduous canopy trees shall be installed in 45L pot size to offset the loss of trees on site. Provision of adequate soil volume on trees growing over slabs must be provided to allow the trees to attain their full size and provide benefit.

- The retention of Tree No.'s 18, 19 & 22. The construction will not impact these trees.
- The retention of Tree 21. This is contingent on the redesign of the 'Covered Walkway' to be removed from the TPZ of the tree in the plans.
- Tree sensitive construction measures must be implemented if works are to proceed within the TPZ of any tree to be retained as prescribed by the Australian Standard AS4970-2009 Protection of trees on development sites. Specifically the final cut of roots should result in a clean cut, using appropriate tools. Severing roots by earthmoving equipment is unacceptable.
- Pruning of branches should comply with Australian Standard No *4373 -2007 - Pruning of Amenity Trees*. Branch reduction should be made to internal lateral branches or stems which are at least 1/3rd of the diameter of the branch being cut – or – removed at the branch collar, consistent with AS *4373 -2007; Sections 6.4 a) & b) and 7.3.* Deadwooding should be carried out concurrently.
- This arboricultural assessment should be reviewed upon the preparation of stormwater or revised architectural plans.
- Project Arborist supervision is required for all works located within the TPZ of all retained trees.
- A minimum AQF Level 5 Project Arborist shall be engaged to certify the tree protection works in accordance with the hold points provided at **6.3. Hold Points** (page12).
- For additional tree protection notes see **10. General Tree Protection Notes** (page 22).

# 6. Tree Management

## 6.1. Tree Management Objectives

The general tree management objectives include:

- Appointment of a Project Arborist who has a minimum Level 5 AQF Arboriculture qualification and experience in managing trees on construction sites.
- Installation of additional root, trunk and branch protection as required to protect retained trees where minor encroachments within the TPZ are anticipated.

- The installation of a Tree Protection Fence to enclose and protect the TPZ.
- Monitoring, inspection and certification of tree protection as per the below hold points.

## 6.2. Management Objective Priorities

The prioritisation of the above objectives is integral for the successful management of site trees:

1. Protection of the TPZ of retained trees;
2. Protection of the trunk and branches of retained trees;
3. Reduction of stress related to construction impacts;
4. The ongoing viability of retained trees after practical completion.

## 6.3. Hold Points, Inspection and Certification

To ensure this plan is implemented hold points (**HP**) have been specified in the schedule of works (below). Once each stage is reached the work will be inspected and certified by the Project Arborist and the next stage may commence.

Alterations to this schedule may be required due to necessity however this shall be through consultation with the Project Arborist only.

## 6.4. Schedule of Works and Responsibilities

| Hold Point | Task | Responsibility | Certification | Timing of Inspection |
|---|---|---|---|---|
| 1 | Indicate clearly (with spray paint on trunks) trees approved for removal only | Principal Contractor | Project Arborist | Prior to demolition and site establishment. |
| 2 | Install TPF and additional root, trunk and/or branch protection | Principal Contractor | Project Arborist | Prior to demolition and site establishment. |
| 3 | Supervise all excavation works proposed within the TPZ | Principal Contractor | Project Arborist | As required prior to the works proceeding adjacent to tree |
| 4 | Inspection of trees by Project Arborist | Principal Contractor | Project Arborist | Quarterly during construction period |
| 5 | Inspection of trees by Project Arborist | Principal Contractor | Project Arborist | Following the removal of tree protection measures from HP 2 |
| 6 | Final Inspection of trees by Project Arborist | Principal Contractor | Project Arborist | Prior to issue of occupation certificate. |

# 7. Tree Survey Table

| NO# | Genus | Species | Common Name | Height | Spread | Trunk Dia | Trunk Dia 2 | Trunk Dia 3 | Trunk Dia 4 | DBH | DRB | SRZ | TPZ | Age | Health | Crown | Signifi-cance | Am | Eco | Form | Development Setback and Encroachment | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | *Platanus* | *x acerifolia* | London Plane | 8 | 7 | 530 | | | | 530 | 580 | 2633 | 6360 | M | F | F | L | L | L | CD | Within development footprint | Growing 200mm West of retaining wall. Trunk lean to East with canopy biased to West. Exposed roots 1.5m long to North and South. Partially occluded pruning wounds (Ø 200mm x 180mm) at 1m and 1.6m to north and at 2m and 3m to East. |
| 2 | *Corymbia* | *maculata* | Spotted Gum | 16 | 8 | 410 | | | | 410 | 520 | 2515 | 4920 | M | F | Av | M | H | H | CD | Within development footprint | Straight trunk. Canopy on top third of tree clear of parking building. Armillaria fruiting bodies growing at base. Canopy showing reduced density and lighter colour than companion tree. |
| 3 | *Corymbia* | *maculata* | Spotted Gum | 15 | 8 | 470 | | | | 470 | 540 | 2555 | 5640 | M | Av | Av | H | H | H | CD | Within development footprint | Trunk lean to West self correcting at 2m. Canopy biased to East because of clearance pruning for building on West. Canopy density and colour normal. No fungal fruiting bodies present. |
| 4 | *Melaleuca* | *quinquenervia* | Broad-leaved Paperbark | 10 | 6 | 370 | | | | 370 | 440 | 2344 | 4440 | SM | Av | Av | M | M | H | CD | Within development footprint | Straight trunk. Canopy on top half of tree biased to west. Pruned on East for pole clearance. Exposed roots to West (2m) and East (1m). Pruning wound occluding at 1.3m on East. |
| 5 | *Corymbia* | *maculata* | Spotted Gum | 6 | 4 | 110 | 130 | | | 171 | 260 | 1879 | 2052 | Y | Av | Av | L | L | M | CD, M | Within development footprint | Codominant from base. Skewed to Southeast. |
| 6 | *Corymbia* | *maculata* | Spotted Gum | 17 | 8 | 490 | | | | 490 | 630 | 2726 | 5880 | M | G | Av | H | H | H | D | Within development footprint | Codominant from 5m Junction appears sound without excessive lateral swelling. |
| 7 | *Eucalyptus* | *cinerea* | Argyle apple | 6 | 5 | 160 | 130 | 110 | 80 | 247 | 320 | 2051 | 2964 | SM | Av | Av | L | L | M | CD, M | Within development footprint | Multitrunked from base. Previously lopped at 2m |
| 8 | *Corymbia* | *maculata* | Spotted Gum | 9 | 7 | 310 | | | | 310 | 370 | 2180 | 3720 | SM | Av | F | M | M | M | D | Within development footprint | Located in garden bed. Crown in top third of tree. Pruning wounds to Northeast and Northwest at 2m and 4m respectively. Small deadwood present in canopy (Ø 50mm) |
| 9 | *Eucalyptus* | *saligna* | Sydney Blue Gum | 8 | 7 | 410 | | | | 410 | 590 | 2652 | 4920 | M | F | F | M | M | H | D | Within development footprint | Exposed roots. Pruning wound at 500mm occluding to South. Pruned for overhead services and building clearance. Some epicormic growth present. |
| 10 | *Eucalyptus* | *saligna* | Sydney Blue Gum | 9 | 7 | 450 | | | | 450 | 510 | 2494 | 5400 | M | Av | Av | M | M | H | CD | Within development footprint | Exposed roots. Dead branch (Ø 80mm ) at 2.5m to West. Natural bracing occurring between first and second order branches at 4m. |
| 11 | *Eucalyptus* | *saligna* | Sydney Blue Gum | 9 | 7 | 360 | | | | 360 | 510 | 2494 | 4320 | M | Av | Av | M | M | H | CD | Within development footprint | Exposed roots. Occluded wounds along main stem. |



No impact
Minor encroachment
Major encroachment
Within development footprint

| NO# | Genus | Species | Common Name | Height | Spread | Trunk Dia 1 | Trunk Dia 2 | Trunk Dia 3 | Trunk Dia 4 | DBH | DRB | SRZ | TPZ | Age | Health | Crown | Signifi-cance | Am | Eco | Form | Development Setback | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **12** | *Eucalyptus* | *saligna* | Sydney Blue Gum | 7 | 5 | 200 | | | | 200 | 220 | 1752 | 2400 | SM | Av | F | L | L | H | CD | Within development footprint | Growing in group in garden bed. Trunk lean to Northeast. |
| **13** | *Eucalyptus* | *saligna* | Sydney Blue Gum | 9 | 6 | 350 | | | | 350 | 400 | 2252 | 4200 | M | Av | Av | M | M | H | CD | Within development footprint | Growing in a group in garden bed. |
| **14** | *Eucalyptus* | *saligna* | Sydney Blue Gum | 6 | 3 | 160 | | | | 160 | 200 | 1683 | 2000 | Y | Av | F | L | L | H | CD | Within development footprint | Growing in a group in garden bed. |
| **15** | *Eucalyptus* | *saligna* | Sydney Blue Gum | 6 | 3 | 150 | | | | 150 | 190 | 1647 | 2000 | Y | Av | F | L | L | H | CD | Within development footprint | Growing in a group in garden bed. |
| **16** | *Eucalyptus* | *saligna* | Sydney Blue Gum | 6 | 5 | 200 | | | | 200 | 230 | 1785 | 2400 | SM | Av | Av | L | L | H | CD | Within development footprint | Growing in a group in garden bed. |
| **17** | *Eucalyptus* | *saligna* | Sydney Blue Gum | 9 | 6 | 300 | 200 | 200 | | 413 | 600 | 2670 | 4956 | M | Av | Av | M | M | H | CD | Within development footprint | Growing in garden bed. 3 Codominant stems from base. |
| **18** | *Eucalyptus* | *botryoides* | Southern Mahogany | 9 | 9 | 580 | | | | 580 | 630 | 2726 | 6960 | M | Av | Av | M | M | H | D | Within development footprint | Canopy on northern side pruned for overhead service clearance. Trunk lean to South. Epicormic growth to North. Exposed roots to South for 2m. |
| **19** | *Eucalyptus* | *sp* | | 7 | 6 | 450 | | | | 450 | 490 | 2453 | 5400 | M | Av | Av | M | M | H | CD | No impact | Council owned tree. Codominant at 1.4m 1st order branch growing parallel to ground in a norther direction |
| **20** | *Eucalyptus* | *sp* | | 7 | 6 | 460 | | | | 460 | 520 | 2515 | 5520 | M | Av | Av | M | M | H | CD | No impact | Council owned tree. Trunk lean to Northeast. Exposed roots. Several pruning wounds showing exposed heartwood at different stages of occlusion. Good vigour |
| **21** | *Pinus* | *radiata* | Radiata Pine | 6 | 5 | 240 | | | | 240 | 260 | 1879 | 2880 | M | P | P | L | M | L | CD | Located 0.9m from new covered walkway providing an unsustainable major (25.1%) encroachment within the TPZ and encroachment within the SRZ | Council owned tree. Trunk lean and canopy skewed to Northwest. Snapped main stem at 5m. Small dead stubs along main trunk |
| **22** | *Pinus* | *radiata* | Radiata Pine | 7 | 6 | 300 | | | | 300 | 320 | 2051 | 3600 | M | F | F | L | M | L | CD | No impact | Council owned tree. Canopy skewed to Northwest. Small diameter stubs along 3 codominant stems |



| |
|---|
| No impact |
| Minor encroachment |
| Major encroachment |
| Within development footprint |

# 8. Tree Survey Table Notes

## 8.1. Genus, Species and Common Name

The botanical and common name of each tree is identified and recorded. Occasionally the exact species name is unknown; *sp.* is recorded to indicate this.

## 8.2. Height, Spread, Trunk Dia, DBH and DRB

- The tree's height and spread is recorded in metres.
- The tree **DBH** is recorded in millimetres. DBH is an abbreviation of Diameter (of the trunk) measured at Breast Height (or 1.2m from the base of the trunk). If more than one trunk is present the DBH is calculated in accordance with AS4970-2009 Protection of Trees on Development Sites.
- If the tree has multiple trunks multiple trunks each trunk DBH (**Trunk Dia**) will be recorded individually.
- The tree **DRB** is recorded in millimetres. DRB is an abbreviation of Diameter (of the trunk) measured above the Root Buttress. It is required to calculate the SRZ in accordance with AS4970-2009 Protection of Trees on Development Sites when there is major encroachment within the TPZ, i.e. greater than 10% is encroached upon or if there is an encroachment within the SRZ.

## 8.3. Age

The age class of each tree is estimated as either:

- **J** – Juvenile, a young sapling, easily replaced from nursery stock.
- **SM** - Semi Mature, a tree that has not grown to mature size.
- **M** - Mature, a tree that has reached mature size and will slowly increase in size over time.
- **OM** - Over Mature, a tree that has been mature for a long period and is beginning to display signs of decline, e.g. large dead branches.
- **S** - Senescent, an over mature tree that is now in decline.

## 8.4. Health and Vigour

The trees health and vigour is recorded as a measurement of:

- **G** - Good the tree does not appear stressed with no excessive dieback, insect infestation, decay, dead wood or epicormic shoots.
- **Avg** - Average Health the tree appears stressed and have some crown dieback, and/or a few epicormic shoots, and/or some dead wood in the crown and some new growth at branch tips. These trees may benefit from remediation of the growing environment to reduce stress and return it to good health.
- **F** - Fair the tree may have areas of crown dieback, and/or epicormic shoots, and/or areas of decay, and/or reduced new growth at branch tips. These trees have been stressed for a short period of time, remediation of the growing environment may improve the trees health.
- **P** - Poor the tree may have large areas of crown dieback, and/or many epicormic shoots, and/or reduced new growth at branch tips. These trees have been stressed for a long time, remediation of the growing environment would not return the tree to good health.

- **D** – Dead the tree is dead

## 8.5. Crown Condition

The crown condition of each tree is assessed and recorded as either:

- **G** - Good Condition: the tree appears to have no visible indication of inherent structural defects.
- **Avg** - Average Condition: the tree has minor structural defects which may be corrected with remedial works or pruning, allowing the tree to return to Good Condition.
- **F** - Fair Condition: the tree has visible structural defects such as (but not limited to) dead branches, and/or an unbalanced crown, and/or leaning trunk and/or areas of decay. These trees do not demonstrate the typical form of their species, or have been damaged or have begun to deteriorate. Remedial works or pruning may return the tree to Average Condition.
- **P** - Poor Condition: the tree has significant structural defects such as (but not limited to) very large dead branches, and/or extremely unbalanced crown, and/or subsiding trunk and/or large areas of decay. These trees do not demonstrate the typical form of their species, or have been severely damaged or have deteriorated significantly. Remedial pruning would not return the tree to Fair Condition.

## 8.6. Significance

Measured as High, Medium or Low, see **2.7. Determining a tree's significance** (page 7). Significance may be expressed in increments of High, Medium or Low. For a High rating the majority (≥4) of the answers will be yes; For a Medium-High rating 3.5 of the answers will be yes; for a Medium rating half (=3) of the answers will be yes; for a Low-Medium rating 2.5 of the answers will be yes; and for the Low rating the minority of answers will be yes (≤2).

## 8.7. Amenity Value

Amenity value is a subjective measurement based on the tree's contribution to the landscape, it may be based on the tree's visual form, however it also includes non visual attributes such as provision of shade for a seat, screening of poor views or for privacy, or if it has historical significance. The amenity value is recorded as:

- **H** - High, the trees form is an excellent example of its species and it makes a great specimen and/or it has other attributes such screening, or is historical significance. These trees are visually prominent and valuable to the community or public domain.
- **M** - Medium, the tree may have an altered form and/or it has attributes that provides amenity to local residents only.
- **L** – Low, the tree is not a good specimen and it does not provide substantial benefit to local residents or the community.

## 8.8. Ecological Value

Ecological value is a measurement of the trees contribution to the environment. It is determined by the trees area of origin, its potential to provide habitat to native fauna and its potential to become an environmental pest. The ecological value is recorded as:

- **H** - High, the tree is locally native or remnant and/or it has habitat value for native fauna.
- **M** - Medium the tree is native but not locally native.
- **L** - Low, the tree is not native and/or it may be a listed nuisance or weed species.
- **Ha** – Habitat, is the tree valued by fauna for food (ie. foliage fruit or sap) or shelter (ie. nesting, roosting, dray or hollow).

## 8.9. Form

The form, structure or shape of each tree is assessed and recorded as either one or a combination of several of the below terms; (**U**) Upright, (**B**) Broad, (**C**) Conical, (**Sh**) Shrub, (**CS**) Crown Shy (also referenced is the adjacent dominant tree canopy ie. **T4**), (**V**) Vase, (**D**) Dome, (**P**) Palm, (**S**) Spreading, (**L**) Leaning or (**BM**) Basal Multi Trunked.

Crown form may also be assessed in accordance with the relationship with the neighbouring tree and recorded as either: **S** - Suppressed, the crown is located beneath another larger crown and is leaning away (Crown Shy); **CD** - Codominant, the crown is adjacent to another crown of similar size, their crown areas may appear joined; **D** - Dominant, the crown is above other lower crowns; **E** - Emergent, the crown emerges from a lower canopy formed by other dominant or codominant crowns.

## 8.10. Indicative Canopy area

This is indicated in square metres and rounded to the closest whole square metre. Each figure is calculated from average crown spread measured on site of individual trees and assumes a circular shape. Crown overlapping of adjacent trees is not taken into account.

## 8.11. Defects

The presence of one or a combination of several defects is recorded (**W**) Wound, (**D**) Decay, (**F**) Fungus, (**B**) Bulge, (**FB**) Fibre Buckling, (**C**) Cracks, (**S**) Split, (**H**) Hollow, (**DB**) Die Back, (**E**) Epicormic shoots, (**DW**) Dead Wood, (**I**) Inclusion, (**CA**) Cavities, (**PF**) Previous Failure, (**R**) Root Damage, (**P**) Pruning wound, (**PD**) Pests and diseases, (**ST**) Storm Damage.

## 8.12. SRZ (Structural Root Zone)

The SRZ is a radial area extending outwards from the centre of the trunk. This area contains the majority of the structural woody roots. This area is responsible primarily for stability. Root damage or root loss within this zone greatly increases the opportunity for decay fungi to ingress into the heartwood, causing internal decay in addition to destabilising the tree's structural integrity. The SRZ is calculated as follows (This calculation is derived from the Australian Standard 4970 – 2009 Protection of Trees on Development Sites):

$$\textbf{SRZ (Radius)} = (D \times 50)^{0.42} \times 0.64$$

## 8.13. TPZ (Tree Protection Zone)

The TPZ is a circular area with a radius measured by multiplying the DBH by twelve (12), or a circular area the size of the tree's drip line whichever is greater. This area contains the majority of the essential structural and feeder roots responsible for stability,

gaseous exchange and water and nutrient uptake. Excavation, back filling, compaction or other disturbance should not occur in this area.

The TPZ is used to identify the minimum area required for the safe retention of a given tree. This calculation is derived from the Australian Standard 4970 – 2009 Protection of Trees on Development Sites. An incursion to 10% within the TPZ is potentially acceptable if no other option is available. A major encroachment (in excess of 10%) is required to be clearly justified by the project Arborist and compensated for elsewhere. Justification methodology may vary depending on site or the individual tree's health, vigour and ability to withstand disturbance and may require root investigation.

## 8.14. Development Setback / Impact

The successful retention of trees on construction sites is dependent on the adequate allocation and management of the space above, below and around trees to be retained.

The trunk and canopy of trees to be retained must be protected to ensure the trunk and branches are not damaged during construction. The removal of bark and / or branches allows the potential ingress of micro-organisms which may cause decay. Similarly the removal of bark restricts the tree's ability to distribute water, mineral ions and glucose.

It is essential to prevent the disturbance of the soil beneath the drip line of each tree, because this is the area where oxygen, water and mineral ions are absorbed by tree roots. Oxygen, water and mineral ions are essential for healthy plant growth. If soil becomes compacted, the ability of roots to function correctly is greatly reduced. Similarly the removal or damage of roots will reduce the ability of roots to function correctly. Woody roots provide stability for the tree and they also transport nutrients to the leaves.

The potential implications of removing or damaging roots are threefold:

1. The risk of whole tree failure is increased, as tree roots anchor and stabilise the tree. Woody roots are developed to assist in the support of the tree in prevailing wind, with these roots removed wind throw may occur, which would result in the mass failure of the tree.
2. The ability of the tree to absorb and transfer the essential nutrients, oxygen and water from the soil to the leaves is greatly affected. This will place the tree under stress and reduce the tree's ability to photosynthesise, and in turn cause the tree to use up stored energy reserves. These energy reserves are used to fight infection and insect attack, for new growth, maintenance of existing tissues and also for healing wounds. Once energy reserves become depleted a tree is much more susceptible to drought, disease and pest attack.
3. Open wounds are sites by which decay-causing pathogens can enter the tree. The severance or damage of woody roots creates sites where pathogens may gain ingress. Whilst the effect of decay may not be immediately apparent, the long term health and structure of the tree will be compromised.

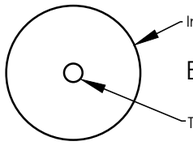
## 8.15. Comments

Comments generally relate to the suitability for retention. The comments allow for a brief notation of other factors relevant to the assessment of the tree.

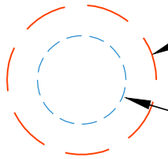
# 9. Tree Location Plan

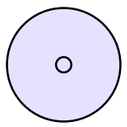
## LEGEND

| | |
|---|---|
| +101.45 | Existing levels |
| + RL 101.55 | Proposed levels |
| + TOW 101.55 | Proposed Top Of Wall levels |
| | Boundary |
| | To be removed / demolished |
| | Hydraulic lines - SW |
| | Building under |
| | Building |
| | Building over |
| | Retaining walls |
| | Fence |
| | Earthworks |




Existing tree



Assessed tree within development footprint

Cut - encroachment into Tree Protection Zone


| REVISION | DESCRIPTION | DRAWN | CHECK | DATE |
|---|---|---|---|---|
| A | SUBMITTED TO CLIENT FOR COMMENT | GO | AM | 1-08-18 |

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**WARRINGAH RD & FOREST WAY, FRENCHS FOREST**

CLIENT
**ARE CHEMIN DE LA FORET**

PROJECT: NEW RESIDENCE
DRAWING: TREE LOCATION PLAN

| SCALE | ISSUE | SHEET |
|---|---|---|
| N.T.S. @ A3 | DA | T - 01 |

| DRAWN | CHECK | DATE | REVISION |
|---|---|---|---|
| GO | AM | 1-08-18 | A |

# 10. General Tree Protection Notes

## 10.1. Structural Root Zone (SRZ)

The SRZ is a radial area extending outwards from the centre of the trunk calculated as follows:

$$\textbf{SRZ (Radius)} = (D \times 50)^{0.42} \times 0.64$$

## 10.2. Tree Protection Zone (TPZ)

The TPZ is a radial area extending outwards from the centre of the trunk equal to the DBH x 12. This area shall be protected by a TPF (*see below*). For all trees to be retained a TPZ is to be created and maintained.

The TPZ function is primarily to protect the root zone by restricting access however the canopy of the tree shall also be protected from damage or injury. The Project Arborist shall approve the extent of the TPZ.

The TPZ shall be mulched to a depth of 75mm with an approved organic mulch. Supplementary watering shall be provided in dry periods to reduce water or construction stress, particularly to those trees which may have incurred root disturbance.

An area equivalent to the encroachment is required to be provided (additional to and contiguous with the remaining TPZ) to offset against the encroachment. This additional area is to be protected during construction.

In the TPZ the following activities shall be excluded:

- Excavation, compaction or disturbance of the existing soil.
- The movement or storage of materials, waste or fill.
- Movement or storage of plant, machinery, equipment or vehicles.
- Any activity likely to damage the trunk, crown or root system.
- Scaffolding.

## 10.3. Tree Protection Fencing (TPF)

Prior to site establishment, tree protection fencing shall be installed to establish the TPZ for trees to be retained. Tree protection fencing shall be maintained entire for the duration of the construction program.

Tree protection fencing shall be:

- To enclose as much of the TPZ as can reasonably be enclosed, allowing for pedestrian access and 1m offset around construction footprint and scaffolding.
- Cyclone chain link wire fence or similar, with lockable access gates.
- Certified and Inspected by the Project Arborist
- Installed prior to the commencement of the works.
- Prominently signposted with 300mm x 450mm boards stating "**NO ACCESS TO THIS AREA - TREE PROTECTION ZONE CONTACT PROJECT ARBORIST 0407 006 852**".

## 10.4. Trunk and Root Zone Protection

Other measures may be required in addition to tree protection fencing. These specific protection measures will be installed as directed by the Project Arborist to protect the canopy, trunk or branches from the risk of damage.

The Project Arborist shall be consulted if there is risk of damage to a retained tree. The Project Arborist may require:

- A 75mm layer of approved mulch to be installed to the TPZ.
- A temporary drip irrigation system to be installed to the TPZ.
- Additional root protection to be installed.
- Additional trunk and branch protection to be installed.

## 10.5. Tree Damage

In the event of damage to a tree or the TPZ of a tree to be retained the Project Arborist shall be engaged to inspect and provide advice on remedial action. This should be implemented as soon as practicable and certified by the Project Arborist.

## 10.6. Excavation within the TPZ

Excavation within the TPZ shall be avoided. All care shall be undertaken to preserve tree root systems. Excavation within the canopy drip line or TPZ shall subject to the approval and supervision of the Project Arborist. Excavation shall be executed by hand to avoid damage to roots.

If excavation within the TPZ is required other than that anticipated in this report the Project Arborist shall be notified. A root mapping exercise may be required and should be certified by the Project Arborist. Root mapping shall be undertaken by either ground penetrating radar (GPR), air spade, water laser or by hand excavation. The purpose shall be to locate woody structural roots greater than 50mm in diameter.

Where roots 50mm dia. or greater are encountered, alternative construction method shall be considered to ensure roots are not severed. Adequate allowance must also be made for future radial root growth. In paved areas, consideration should be given to raising the proposed pavement level and using a porous fill material in preference to excavation.

If there is no avoiding placing services through the TPZ excavate outside the TPZ and underbore below the root ball of the tree as directed by the Arborist.

## 10.7. Fill

All fill material to be placed within the TPZ should be approved by Arborist and equal to 5-7mm Round River Pea Gravel to provide aeration and percolation to the root zone. Otherwise no fill should be placed within the TPZ of trees to be retained.

## 10.8. Pavements

Proposed paved areas within the TPZ should be placed on or above grade to minimise excavation, and avoid root severance and/or damage. Pavements should be permeable or avoided otherwise.

## 10.9. Pruning

All pruning work required (including root pruning) should be in accordance with Australian Standard No *4373 -2007 - Pruning of Amenity Trees*.

If required, roots should be severed with clean sharp implement flush with the face of the excavation and maintained in a moist condition. Root pruning shall be performed under the supervision of the Project Arborist.

## 10.10. Tree Removal

Tree removal work shall be carried out by an experienced Level 3 Arborist in accordance with the NSW Work Cover Code of Practice for the Amenity Tree Industry (1998).

Care shall be taken to avoid damage to trees during the felling operation. Stumps shall be grubbed-out using a mechanical stump grinder to a minimum depth of 300mm without damage to other retained root systems.

## 10.11. Post Construction Maintenance

In the event of any tree deteriorating in health after the construction period, the Project Arborist shall be engaged to provide advice on any remedial action. Remedial action shall be implemented as soon as practicable and certified by the Project Arborist.

Tree protection fencing with additional trunk and root protection shall be removed following completion of construction. The mulch layer in the TPZ shall be retained and replenished where required to maintain a 75mm thickness.

# 11. References

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