



FORESTWAY SHOPPING CENTRE WARRINGAH ROAD & FOREST WAY, FRENCHS FOREST

ARBORICULTURAL IMPACT ASSESSMENT

PREPARED FOR:

REVELOP

PREPARED BY:

ANDREW MORRISON

Grad. Cert. Arboriculture, Melb Uni (AQF Level 8)
Dip. Hort, Arboriculture, Ryde TAFE (AQF Level 5)
Dip. Hort, Landscape Design
Cert III Landscape Construction
Ass. Dip. Horticulture
IACA No. ACM0492015



<i>date</i>	<i>revision</i>	<i>prepared</i>	<i>checked</i>
01/11/23	Issued Development Application	AM	AS

Executive Summary

This report was commissioned by Revelop Projects to accompany a Retail Development Application within the precinct of the Northern Beaches Council at the site address of Lot 20 in DP1209801, 22 Forest Way, Frenchs Forest. The aim of this report is to provide an assessment in accordance with AS4970 – 2009 'Protection of trees on development sites' of the potential impacts of the proposed development upon 22 trees.

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 15) also see **8. Tree Survey Table Notes** (page 18) 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 23).

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 23).

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

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

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:

- I. The removal of Tree No.'s 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 & 17 if the development is approved as there is an unsustainable major encroachment into the tree protection zone.
- II. The replacement planting of 8 canopy trees and 7 mid-storey trees shall be installed in 25L pot size to offset the loss of trees on site. Documentation should be prepared that adequately guides species selection, nursery stock specification and delivery, planting & planting soil specification and volume, and attention to formative pruning in the first 5 years

as discussed above in **4.4 Other Tree Comments** (page 11). Planting vaults or similar should be considered in landscape plans for provision of adequate soil to allow the trees to attain their full size and provide maximum achievable benefits.

- III. The retention and protection of Tree No.'s 19, 20, 21 & 22. The construction will not impact these trees.
- IV. The retention and protection of Tree No. 18. Construction documents should be developed in liaison with the Project Arborist to minimise impact to the tree:
 - a. Engineer basement plans should show minimum possible offset of soil disturbance (scraping, excavation etc) outside the outer basement line as shown in the architectural plans.
 - b. Construction drawings of the scaffold layout should show minimum possible offset from proposed wall within the canopy/crown of this tree, to reduce the requirement for clearance pruning. Following the design, the pruning requirements should be assessed by the Project Arborist who should then prepare an appropriate pruning specification.
 - c. A tree health plan should be prepared to include elements which stimulate compensatory root growth outside encroachment areas prior to site works, and protect the tree during construction operations. This should be included in a *Site Specific Tree Protection Plan*.
- V. A *Site-Specific Tree Protection Plan* should be prepared to guide: (A) final construction design and methodology; (B) Tree Protection barrier installation, and; (C) the Project Arborist supervision/direction as necessary to protect the trees during construction works. The plan should be prepared following provision of a CMP (Construction Management Plan) and/or TMP (Traffic Management Plan), in liaison with Construction plans and consistent with any conditions of consent and AS4970 (2009), sections 4 & 5.
- VI. Any additional earthworks within the TPZ of retained trees should be carried out under project arborist supervision by first excavating a narrow trench to the depth required by hand or equivalent. Severing roots by earthmoving equipment is unacceptable.
- VII. Demolition and Construction: Pedestrian and machinery access, material storage and other construction activities which compact the soil should be designated to be outside of TPZs of all retained trees.
- VIII. For additional tree protection information see **6. Tree Management Plan** (page 13) and **10. General Tree Protection Notes** (page 27).
- IX. Revision undertaken of any architectural, Civil, landscape, construction and service plans should be carried out in liaison with the Project Arborist. This arboricultural impact assessment (AIA) should be revised immediately following.
- X. Constructed landscape elements such as retaining walls, paving and other features; and open trenches for services requiring excavation should be located outside the TPZ of all retained trees.
- XI. Layouts of all proposed mains water, gas, electricity and sewer have not been prepared. Plans of all such proposed services must be reviewed, assessed and approved by the project arborist prior to approval or implementation.

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1. Introduction

This report was commissioned by Revelop Projects to accompany a Retail Development Application within the precinct of the Northern Beaches Council at the site address of Lot 20 in DP1209801, 22 Forest Way, Frenchs Forest. The aim of this report is to provide an assessment in accordance with AS4970 – 2009 'Protection of trees on development sites' of the potential impacts of the proposed development upon 22 trees.

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 15) also see **8. Tree Survey Table Notes** (page 18) 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 Arboreport 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.
- Defects such as cambial damage, cracks, decay or hollows may be present which are not visible from the ground. This report does not include an aerial survey of the crown.
- Defects such as root damage, cracks or decay may be present under the ground. This report does not include any subterranean survey of the root plate.
- 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 trees may not arise in the future.

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 measured with a Leica Disto (laser distometer) OR 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 15). 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 18).

The physical data for tree locations, crown width and DRB is schematically described in **9. Tree Location Plan** (page 23).

2.5. Reference Documents

The report was written with reference to:

- 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.
- Architectural Site Plan prepared by Nettleton Tribe Revision P3, dated 07/08/23.
- Architectural Proposed GA Basement 1 plan, prepared by Nettleton Tribe, Revision P5 dated 07/08/23.
- Architectural Proposed GA Ground Floor plan, prepared by Nettleton Tribe Revision P5 dated 07/08/23.
- Architectural Proposed GA Level 1 plan, prepared by Nettleton Tribe Revision P4 prepared by Nettleton Tribe, dated 07/08/23.
- Civil Engineering Works, prepared by Henry & Hymas, Revision 02, dated 25/09/23.
- 11993_DA-031-P3-Demolition Plans, supplied by client on 27/10/23.
- Australian Standard 4970-2009 'Protection of Trees on Development Sites'.

2.6. Council Tree Preservation Regulatory Controls

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 and certain locations.

2.7. Determining a tree's significance

The 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 of botanical interest; Is it included in a significant tree register or listed as a heritage item under the Federal State or Local Regulations?
2. Is the tree visually prominent in the locality?
3. Is the tree well structured?
4. Is the tree in good health and/or does it display signs of good vigour?
5. Is the tree typically formed for the species?
6. 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

The original native vegetation of this area is characterised by the Sandstone Ridgetop Woodland ecological community.

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 ground. The existing surveyed trees are shown at **9. Tree Location Plan** (page 23).

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 23).

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					
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	#	#	#6,	#3,
	Medium	#19, 20,	#	#10, 11, 18,	#2, 4, 8, 9, 13, 17,
	Low	#21, 22	#	#5, 7, 16,	#1, 12, 14, 15
	Total Number of trees	4	0	7	11

4. Discussion

4.1. Trees Not Impacted by the Proposal

- **Medium Significance Trees:** Trees 19 & 20.
- **Low Significance Trees:** Trees 21 & 22.

4.2. Trees with a Major TPZ Encroachment

(Where the proposed construction encroaches within the TPZ by more than 10% or is within the SRZ).

- Trees 5 & 7 are located 0.9m & 0.69m respectively from the proposed excavation associated with basement, providing a 20% & 32% encroachment within the TPZ respectively and encroachment within the SRZ. These trees are considered to be of low significance and should not be a constraint on the development.
- Tree 6 – mature Spotted Gum (*Corymbia maculata*) is located 0.90m from proposed basement excavation providing 42% encroachment within the TPZ and encroachment within the SRZ.

An offset of 500mm excavation from the outer basement line has been assumed to reflect typical basement pile construction. No basement engineering drawings have been issued.

This tree is considered to be of high significance and is suitable for retention.

The species is tolerant of construction impacts, however this encroachment provides a significant and unsustainable impact on the tree. It cannot be retained if the development is approved in its current form.

- Trees 10 & 11 – Early mature Sydney Blue Gum (*Eucalyptus saligna*) are located 0.46m & 0.54m from proposed basement excavation providing 42% & 38% encroachment respectively within the TPZ and encroachment within the SRZ of both trees.

Refer to Discussion, Tree 6, above regarding basement excavation.

The trees are considered to be of medium significance and suitable for retention.

The species is moderately tolerant of construction impacts, however, this amount of cut is a significant impact on the trees and is not sustainable. Extensive redesign would be required to sustainably accommodate them. They cannot be retained if the proposed development is approved in its current form.

- Tree 16 is located 0.44m from proposed basement excavation providing 45% encroachment within the TPZ and encroachment within the SRZ. Refer to Discussion, Tree 6, above regarding basement excavation.

This tree is considered to be of low significance and should not be considered a constraint on the development.

- Tree 18 – mature Southern Mahogany (*Eucalyptus botryoides*) is located 3.05m from proposed basement excavation providing 21% encroachment within the TPZ and encroachment within the SRZ. It is located 2.04m from anticipated 1.5m wide scaffold to around 8m height providing an estimated 18% encroachment in lower crown (10% of crown volume).

An offset of 500mm excavation from the outer basement line has been assumed to reflect typical basement pile construction. No basement engineering drawings have been issued.

This tree is considered to be of Medium significance and is suitable for retention.

The species is moderately tolerant of construction impacts. The basement excavation encroachment provides a moderate and sustainable impact, providing adequate tree management effectively ensures minimisation of design impacts, protection from approved construction operations and adequate compensation for root loss. However, consideration should be given to design basement piling and excavation which minimises soil disturbance outside the outer line of basement.

Tree management before, during and after demolition and construction works should provide for i) active root proliferation in protected, non-affected areas within and adjacent to the TPZ to compensate for immediate root loss from basement excavation and ii) to protect both above and below ground parts from further damage during demolition and construction.

Details of scaffolding have not been issued. We anticipate a scaffold width of 1.5m will be used and clearance will be required for this width to the roof line. In plan, this represents an encroachment of 19%. In reality, only the lower crown will be impacted as the tree is some 5m higher than the scaffold. Due to the stiffness of the branch wood of this species is unlikely that tying branches back to provide clearance is an option. Therefore pruning will be required. We estimate that around 10% of the lower southern crown will require removal, involving cuts of 100mm dia or less. This is considered a low and sustainable impact. More detailed assessment of the scaffold design and tree pruning requirements should be undertaken in the construction certificate design

development phase, and a tree pruning specification be prepared as part of a *site-specific tree protection plan*.

When considered cumulatively, the encroachments are a moderate and sustainable impact on the tree.

As per 4970-2009 Protection of trees on construction sites, the TPZ should be managed according to a Construction Tree Management Plan outlined in Section 6 and *site-specific Tree Protection Plan* prepared by a minimum AQF Level 5 Arborist, following development approval and provision of conditions. The plan should provide methodology and certification points to ensure optimal protection and maximise remedial soil/root care during construction and for a minimum 52-week period following Final Completion.

4.3. Trees within the development footprint

- Tree 8 is located within the proposed public domain footpath. This tree is considered to be of medium significance and is suitable for retention, however extensive redesign would be required to sustainably accommodate this tree. It cannot be retained if the proposed development is approved in its current form.
- Tree 9 is located within the proposed basement excavation (see discussion, Tree 6). This tree is considered to be of medium significance and is suitable for retention, however extensive redesign would be required to sustainably accommodate this tree. It cannot be retained if the proposed development is approved in its current form.
- Trees 12, 14 & 15 are located within the proposed basement excavation footprint. Refer to Discussion, Tree 6, above regarding basement excavation. These trees are considered to be of low significance and should not be considered a constraint on the development.
- Trees 13 & 17 are located within the proposed basement excavation (see discussion, Tree 6).

These trees are considered to be of medium significance and suitable for retention, however extensive redesign would be required to sustainably accommodate them. They cannot be retained if the proposed development is approved in its current form.

4.4. Other Tree Comments

- **Replacement planting in limited garden surface area/ hardstand** 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.

If done well, the planting of trees is an investment in an asset which will grow in size and value, providing three categories of benefits or services for decades. These are i) *amenity services* (shade, screening, buffering from temperature extremes), ii) *psychological services* (feelings of well-being associated with being in a particular place) and iii) *ecological services* (such as absorption of carbon dioxide, carbon sequestration, pollutant absorption and interception of rainfall which reduces pressure on stormwater services).

A tree's ability to provide the above services abundantly for the long term i.e., decades into the future, is directly related to several factors. The 4 factors that are particularly relevant at development construction stage are listed below:

1. Correct species selection in light of modelled climate change scenarios;

2. Specification and delivery of correctly grown tree nursery stock (consistent with the principles of AS2303-2018)
3. Specification and delivery of maximum possible volume of optimal quality planting media underneath hardstand by the use of planting vaults, Stockholm method or similar to allow the trees to attain their full size and usefulness without ongoing maintenance costs.
4. Specification and delivery of formative and structural pruning of the developing trees, particularly in the first 5 years.

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:

- I. The removal of Tree No.'s 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 & 17 if the development is approved as there is an unsustainable major encroachment into the tree protection zone.
- II. The replacement planting of 8 canopy trees and 7 mid-storey trees shall be installed in 25L pot size to offset the loss of trees on site. Documentation should be prepared that adequately guides species selection, nursery stock specification and delivery, planting & planting soil specification and volume, and attention to formative pruning in the first 5 years as discussed above in **4.4 Other Tree Comments** (page 11). Planting vaults or similar should be considered in landscape plans for provision of adequate soil to allow the trees to attain their full size and provide maximum achievable benefits.
- III. The retention and protection of Tree No.'s 19, 20, 21 & 22. The construction will not impact these trees.
- IV. The retention and protection of Tree No. 18. Construction documents should be developed in liaison with the Project Arborist to minimise impact to the tree as follows:
 - a. Engineer basement plans should show minimum possible offset of soil disturbance (scraping, excavation etc) outside the outer basement line as shown in the architectural plans.
 - b. Construction drawings of the scaffold layout should show minimum possible offset from proposed wall within the canopy/crown of this tree, to reduce the requirement for clearance pruning. Following the design, the pruning requirements should be assessed by the Project Arborist who should then prepare an appropriate pruning specification.
 - c. A tree health plan should be prepared to include elements which stimulate compensatory root growth outside encroachment areas prior to site works, and protect the tree during construction operations. This should be included in a *Site Specific Tree Protection Plan*.
- V. A *Site-Specific Tree Protection Plan* should be prepared to guide: (A) final construction design and methodology; (B) Tree Protection barrier installation, and; (C) the Project Arborist supervision/direction as necessary to protect the trees during construction works. The plan should be prepared following DA approval, provision of a CMP (Construction Management Plan) and/or TMP (Traffic Management Plan), in liaison with Construction plans, consistent with any DA conditions of consent and AS4970 (2009), sections 4 & 5.
- VI. Any additional earthworks within the TPZ of retained trees should be carried out under project arborist supervision by first excavating a narrow trench to the depth required by hand or equivalent. Severing roots by earthmoving equipment is unacceptable.

- VII. Demolition and Construction: Pedestrian and machinery access, material storage and other construction activities which compact the soil should be designated to be outside of TPZs of all retained trees.
- VIII. For additional tree protection information see **6. Tree Management Plan** (page 13) and **10. General Tree Protection Notes** (page 27).
- IX. Revision undertaken of any architectural, Civil, landscape, construction and service plans should be carried out in liaison with the Project Arborist. This arboricultural impact assessment (AIA) should be revised immediately following.
- X. Constructed landscape elements such as retaining walls, paving and other features; and open trenches for services requiring excavation should be located outside the TPZ of all retained trees.
- XI. Layouts of all proposed mains water, gas, electricity and sewer have not been prepared. Plans of all such proposed services must be reviewed, assessed and approved by the project arborist prior to approval or implementation.

6. Tree Management Plan

6.1. Management Objectives:

The prioritisation of the following 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 on retained trees from construction;
- 4. To ensure the viability of retained trees after practical completion.

6.2. Tree Management Actions:

The above general tree management objectives are achieved by:

- Appointment of a Level 5 AQF Project Arborist experienced in managing trees on construction sites to prepare and certify a Tree Management Plan.
- The installation of a Tree Protection Fence to enclose and protect the TPZ.
- Installation of additional root, trunk and branch protection as required to protect retained trees where minor encroachments within the TPZ are anticipated.
- Supervision, monitoring, inspections and certification of tree protection as outlined in the Tree Management Plan.

6.3. Schedule of Hold Points, Inspections 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.

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 and complete all Pre-Commencement tree health measures in Site-Specific Tree Protection Plan	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 at Practical Completion.	Principal Contractor	Project Arborist	Following the removal of tree protection measures from HP 3
6	Final Inspection of trees by Project Arborist at Final Completion.	Principal Contractor	Project Arborist	Prior to issue of occupation certificate.

7. Tree Survey Table

High
Medium
Low

Retain
Remove

No impact	Minor encroachment
Major encroachment	Within development footprint

NO#	Botanic Name	Common Name	Height (m)	Spread (m)	Trunk Dia (mm)	Trunk Dia 2 (mm)	Trunk Dia 3 (mm)	Trunk Dia 4 (mm)	DBH (mm)	DRB (mm)	SRZ (mm)	TPZ (mm)	Age	Health	rown Con	Signifi- cance	Am	Eco	Crown Form	Ret/ Rem	Development Setback and Encroachment	Comments
1	<i>Platanus x acerifolia</i>	London Plane	8	7	530				530	580	2633	6360	M	F	F	L	L	L	CD	Rem.	Located within development footprint - stairs to proposed footbridge	Growing 200mm West of retaining wall. Wall deflected from trunk base. Trunk lean to East with canopy biased to West. Exposed roots 1.5m long to North and South. Lowest FOBs previously removed on E side, leaving partially occluded pruning wounds (Ø 200mm x 180mm) at 1m and 1.6m to north and at 2m and 3m to East. 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.
2	<i>Corymbia maculata</i>	Spotted Gum	16	8	410				410	520	2515	4920	M	F	Av	M	H	H	CD	Rem.	Located within development footprint - basement	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.
3	<i>Corymbia maculata</i>	Spotted Gum	15	8	470				470	540	2555	5640	M	Av	Av	H	H	H	CD	Rem.	Located within development footprint - basement	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.
4	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	10	6	370				370	440	2344	4440	SM	Av	Av	M	M	H	CD	Rem.	Located within development footprint - basement	
5	<i>Corymbia maculata</i>	Spotted Gum	6	4	110	130			171	260	1879	2052	Y	Av	Av	L	L	M	CD, M	Rem.	Located 0.90m from proposed basement excavation providing 20% encroachment within the TPZ and encroachment within the SRZ.	Codominant from base. Skewed to Southeast.
6	<i>Corymbia maculata</i>	Spotted Gum	17	8	490				490	630	2726	5880	M	G	Av	H	H	H	D	Rem.	Located 0.90m from proposed basement excavation providing 42% encroachment within the TPZ and encroachment within the SRZ.	Codominant from 5m Junction appears sound without excessive lateral swelling.
7	<i>Eucalyptus cinerea</i>	Argyle apple	6	5	160	130	110	80	247	320	2051	2964	SM	Av	Av	L	L	M	CD, M	Rem.	Located 0.69m from proposed basement excavation providing 32% encroachment within the TPZ and encroachment within the SRZ.	Multitrunked from base. Previously lopped at 2m
8	<i>Corymbia maculata</i>	Spotted Gum	9	7	310				310	370	2180	3720	SM	Av	F	M	M	M	D	Rem.	Located within development footprint - public domain path	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	<i>Eucalyptus saligna</i>	Sydney Blue Gum	8	7	410				410	590	2652	4920	EM	F	F	M	M	H	D	Rem.	Located within development footprint - proposed basement excavation	Exposed roots. Pruning wound at 500mm occluding to South. Pruned for overhead services and building clearance. Some epicormic growth present.
10	<i>Eucalyptus saligna</i>	Sydney Blue Gum	18	7	450				450	510	2494	5400	EM	Av	Av	M	M	H	CD	Rem.	Located 0.46m from proposed basement excavation providing 42% encroachment within the TPZ and encroachment within the SRZ.	Exposed roots. Dead branch (Ø 80mm) at 2.5m to West. Natural bracing occurring between first and second order branches at 4m.
11	<i>Eucalyptus saligna</i>	Sydney Blue Gum	18	7	360				360	510	2494	4320	EM	Av	Av	M	M	H	CD	Rem.	Located 0.54m from proposed basement excavation providing 38% encroachment within the TPZ and encroachment within the SRZ.	Exposed roots. Occluded wounds along main stem.
12	<i>Eucalyptus saligna</i>	Sydney Blue Gum	13	5	200				200	220	1752	2400	SM	Av	F	L	L	H	CD	Rem.	Located within development footprint - proposed basement excavation	Growing in group in garden bed. Trunk lean to Northeast.
13	<i>Eucalyptus saligna</i>	Sydney Blue Gum	17	6	350				350	400	2252	4200	SM	Av	Av	M	M	H	CD	Rem.	Located within development footprint - proposed basement excavation	Growing in a group in garden bed.
14	<i>Eucalyptus saligna</i>	Sydney Blue Gum	12	3	160				160	200	1683	2000	Y	Av	F	L	L	H	CD	Rem.	Located within development footprint - proposed basement excavation	Growing in a group in garden bed.
15	<i>Eucalyptus saligna</i>	Sydney Blue Gum	12	3	150				150	190	1647	2000	Y	Av	F	L	L	H	CD	Rem.	Located within development footprint - proposed basement excavation	Growing in a group in garden bed.
16	<i>Eucalyptus saligna</i>	Sydney Blue Gum	13	5	200				200	230	1785	2400	SM	Av	Av	L	L	H	CD	Rem.	Located 0.44m from proposed basement excavation providing 45% encroachment within the TPZ and encroachment within the SRZ.	Growing in a group in garden bed.
17	<i>Eucalyptus saligna</i>	Sydney Blue Gum	17	6	300	200	200		413	600	2670	4956	M	Av	Av	M	M	H	CD	Rem.	Located within development footprint - proposed basement excavation	Growing in garden bed. 3 Codominant stems from base.

High
Medium
Low

Retain
Remove

No impact
Major encroachment
Minor encroachment
Within development footprint

NO#	Botanic Name	Common Name	Height (m)	Spread (m)	Trunk Dia (mm)	Trunk Dia 2 (mm)	Trunk Dia 3 (mm)	Trunk Dia 4 (mm)	DBH (mm)	DRB (mm)	SRZ (mm)	TPZ (mm)	Age	Health	rown Coni	Signifi- cance	Am	Eco	Crown Form	Ret/ Rem	Development Setback and Encroachment	Comments
18	<i>Eucalyptus botryoides</i>	Southern Mahogany	13	9	580				580	630	2726	6960	M	Av	Av	M	M	H	D	Ret.	Located 3.05m from proposed basement excavation providing 21% encroachment within the TPZ and encroachment within the SRZ. Located 2.04m from anticipated 1.5m wide scaffold to around 8m height providing an estimated 18% encroachment in lower crown (10% of crown volume).	Canopy on northern side pruned for overhead service clearance. Trunk lean to South. Epicormic growth to North. Exposed roots to South for 2m.
19	<i>Eucalyptus</i> sp.	eucalypt	7	6	450				450	490	2453	5400	M	Av	Av	M	M	H	CD	Ret.	No encroachment - no impact	Council owned tree. Codominant at 1.4m 1st order branch growing parallel to ground in a norther direction
20	<i>Eucalyptus</i> sp.	eucalypt	7	6	460				460	520	2515	5520	M	Av	Av	M	M	H	CD	Ret.	No encroachment - 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	<i>Pinus radiata</i>	Radiata Pine	6	5	240				240	260	1879	2880	M	P	P	L	M	L	CD	Ret.	No encroachment - no impact	Council owned tree. Trunk lean and canopy skewed to Northwest. Snapped main stem at 5m. Small dead stubs along main trunk
22	<i>Pinus radiata</i>	Radiata Pine	7	6	300				300	320	2051	3600	M	F	F	L	M	L	CD	Ret.	No encroachment - no impact	Council owned tree. Canopy skewed to Northwest. Small diameter stubs along 3 codominant stems

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 (m), Spread (m), Trunk Dia, DBH and DRB (mm)

- The tree's height and spread (diameter) 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, ie. greater than 10% is encroached upon or if there is an encroachment within the SRZ.

8.3. Age (Maturity)

The age class of each tree is estimated as either:

- **Y = Young**; a well-established but juvenile tree.
- **SM = Semi-mature**; a tree at growth stages between immaturity and full size.
- **EM = Early-mature**; a tree that is more-or-less of mature dimensions yet still vigorously growing.
- **M = Mature**; a full-sized tree with some capacity for further, expansive crown growth.
- **LM = Late Mature**; a tree of full, mature dimensions with little capacity for expansive growth, many years away from decline.
- **OM = Over-mature**; a tree of old age in a phase of slow 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. Structural Condition (Crown)

The structural 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 tree's contribution to the environment. It is determined by the tree's 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
- **Ha** – Habitat, is the tree valued by fauna for food (ie. foliage fruit or sap) or shelter (ie. nesting, roosting, dray or hollow).
- **Wd** – tree is a weed or invasive species.

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:

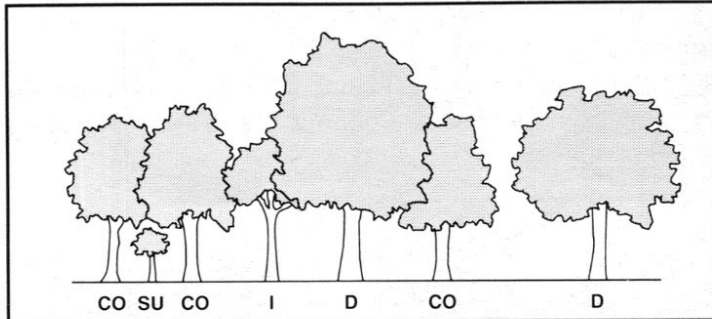
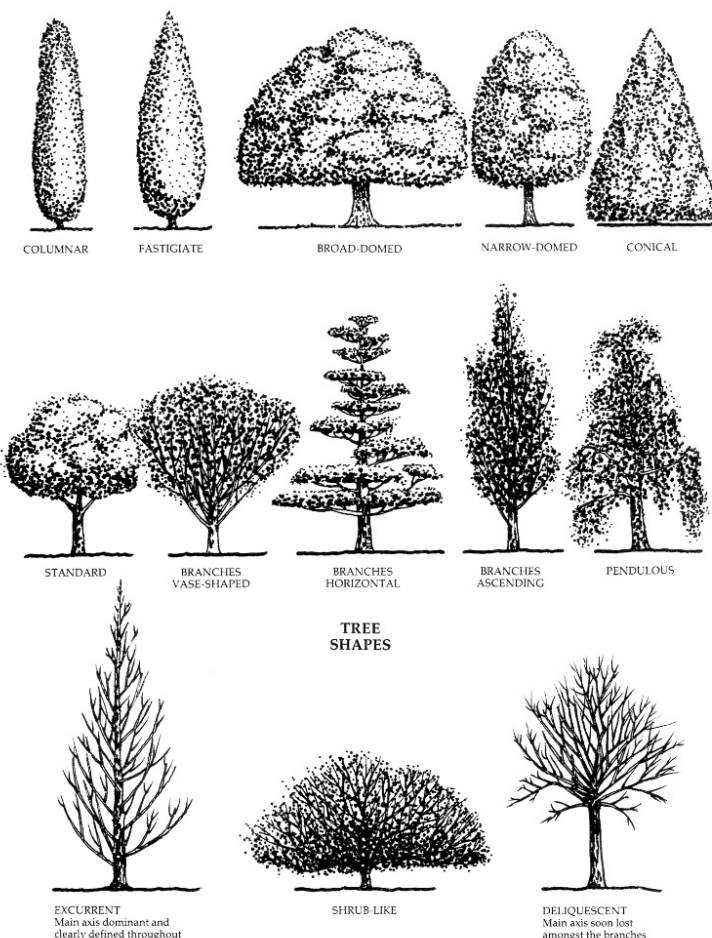


Figure 13. Crown Class is a description of the overall form of the tree as dominant (D), codominant (CO), intermediate (I) or suppressed (SU). Crown class is influenced by the proximity of the tree to other trees. (Adapted from The Hazard Tree Assessment Program, Recreation and Park Dept., City and County of San Francisco)

Forest forms (F) ²⁰: Dominant; Codominant; Intermediate; Suppressed. For sites that contain remnant native vegetation.



Urban Tree forms (U) ²⁹: Columnar; Fastigate; Broad-domed; Narrow-domed; Conical; Standard; Branches Vase-shaped; Branches Horizontal; Branches Ascending; Pendulous; Excurrent; Shrub-like; Deliquescent. For sites that mainly contain Urban trees.

Modifiers: Bias Crown/Asymmetry (BC); Crown Shy (CS) (also referenced is the adjacent dominant tree canopy i.e. T4); Palm (P), Leaning (L); Basal Multi Trunked/stump sprout (BM); Emergent (E), the crown emerges from a lower canopy formed by other dominant or codominant crowns.

8.10. 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.

8.11. SRZ (Structural Root Zone) – Radius (mm)

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, where D = stem diameter in metres):

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

8.12. TPZ (Tree Protection Zone) – Radius (mm)

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.

8.13. 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:

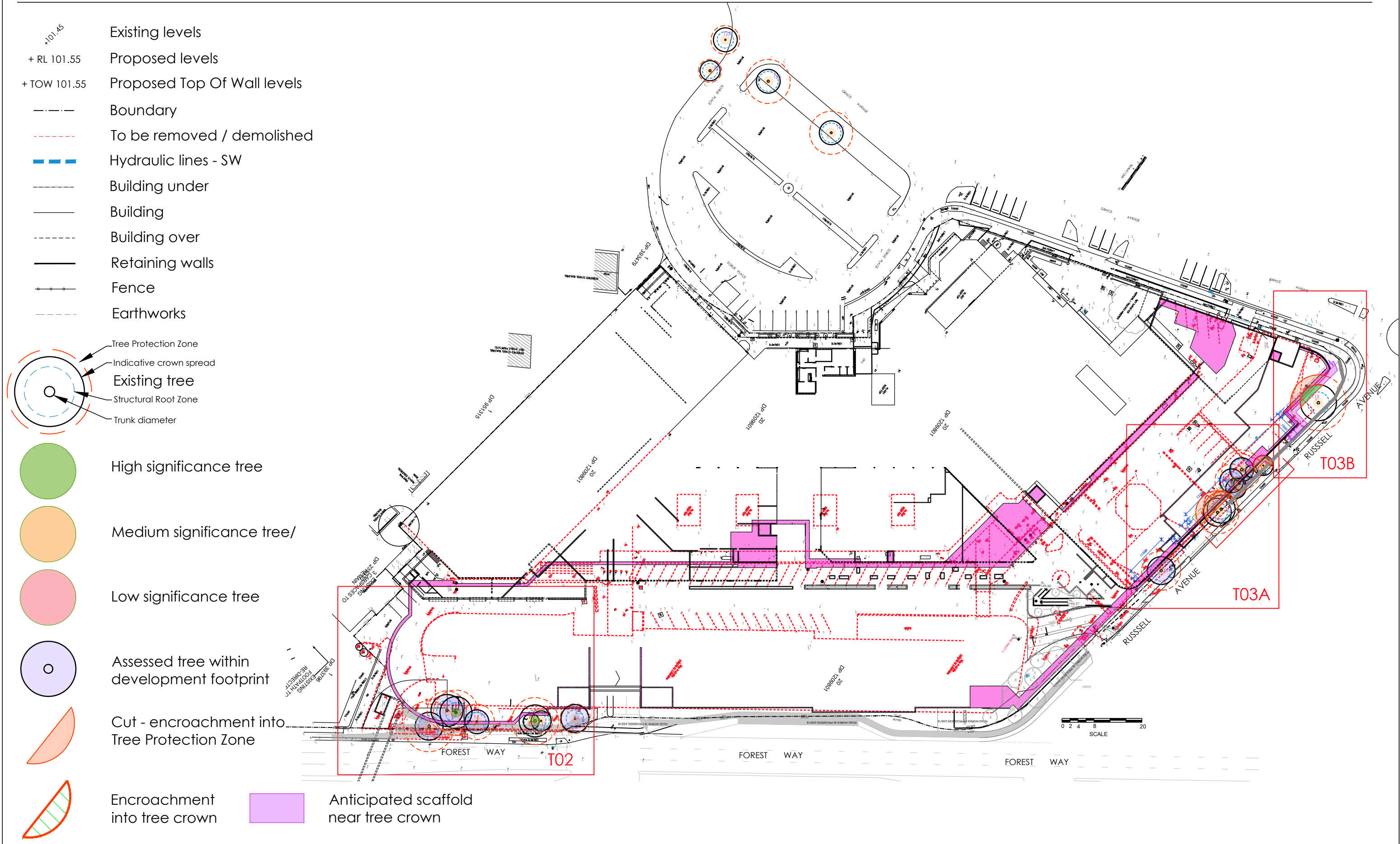
1. The risk of whole tree failure is increased, as tree roots anchor and stabilise the tree. Woody roots are developed to assist in the support of the tree in prevailing wind, with these roots removed wind throw may occur, which would result in the mass failure of the tree.
2. The ability of the tree 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.

8.14. 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



REVISION	DESCRIPTION	DRAWN	CHECK	DATE
A	SUBMITTED TO CLIENT FOR COMMENT	AM	AS	07-06-21
B	SUBMITTED TO CLIENT FOR COMMENT - REVISED LAYOUT	AM	AS	14-07-21
C	SUBMITTED TO CLIENT FOR COMMENT - REVISED LAYOUT - DA	AM	AS	01-11-23



Vegetation Management Consultants

PO Box 8136, Baulkham Hills, NSW 2153
Ph: (02) 9680 7713 Fax: (02) 9680 7705
Email: info@arboreport.com.au
Web: www.arboreport.com.au
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ADDRESS

**FORESTWAY SHOPPING CENTRE
WARRINGAH RD & FOREST WAY, FRENCHS FOREST**

CLIENT

REVELOP

PROJECT

RETAIL REDEVELOPMENT

DRAWING

TREE LOCATION PLAN KEY PLAN

SCALE

N.T.S. @ A3

ISSUE

DA

SHEET

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DRAWN

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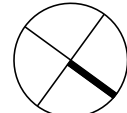
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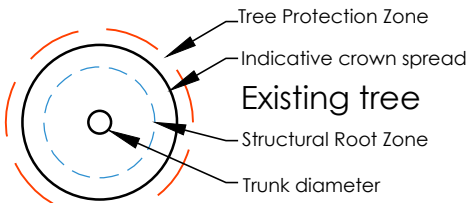
REVISION

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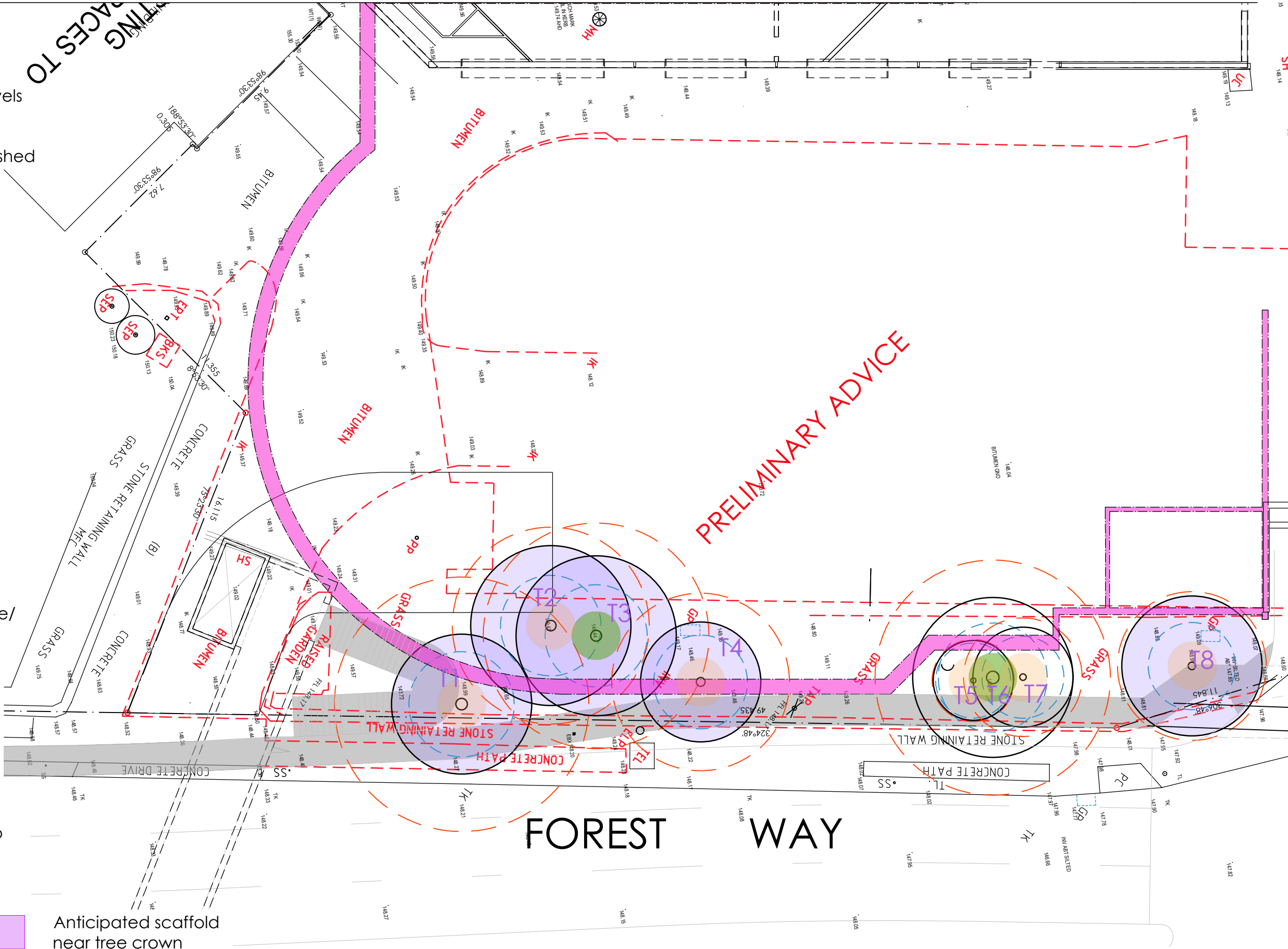
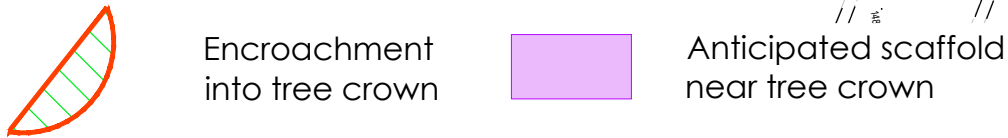
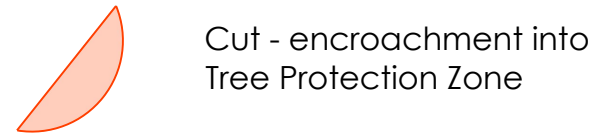


LEGEND

- +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



- High significance tree
- Medium significance tree/
- Low significance tree



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C	SUBMITTED TO CLIENT FOR COMMENT - REVISED LAYOUT - DA	AM	AS	01-11-23



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PROJECT	DRAWING	SCALE	ISSUE	SHEET	DATE	REVISION
RETAIL REDEVELOPMENT	TREE LOCATION PLAN	1:200 @ A3	DA	T - 02	01-11-23	C
AM	AS					

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

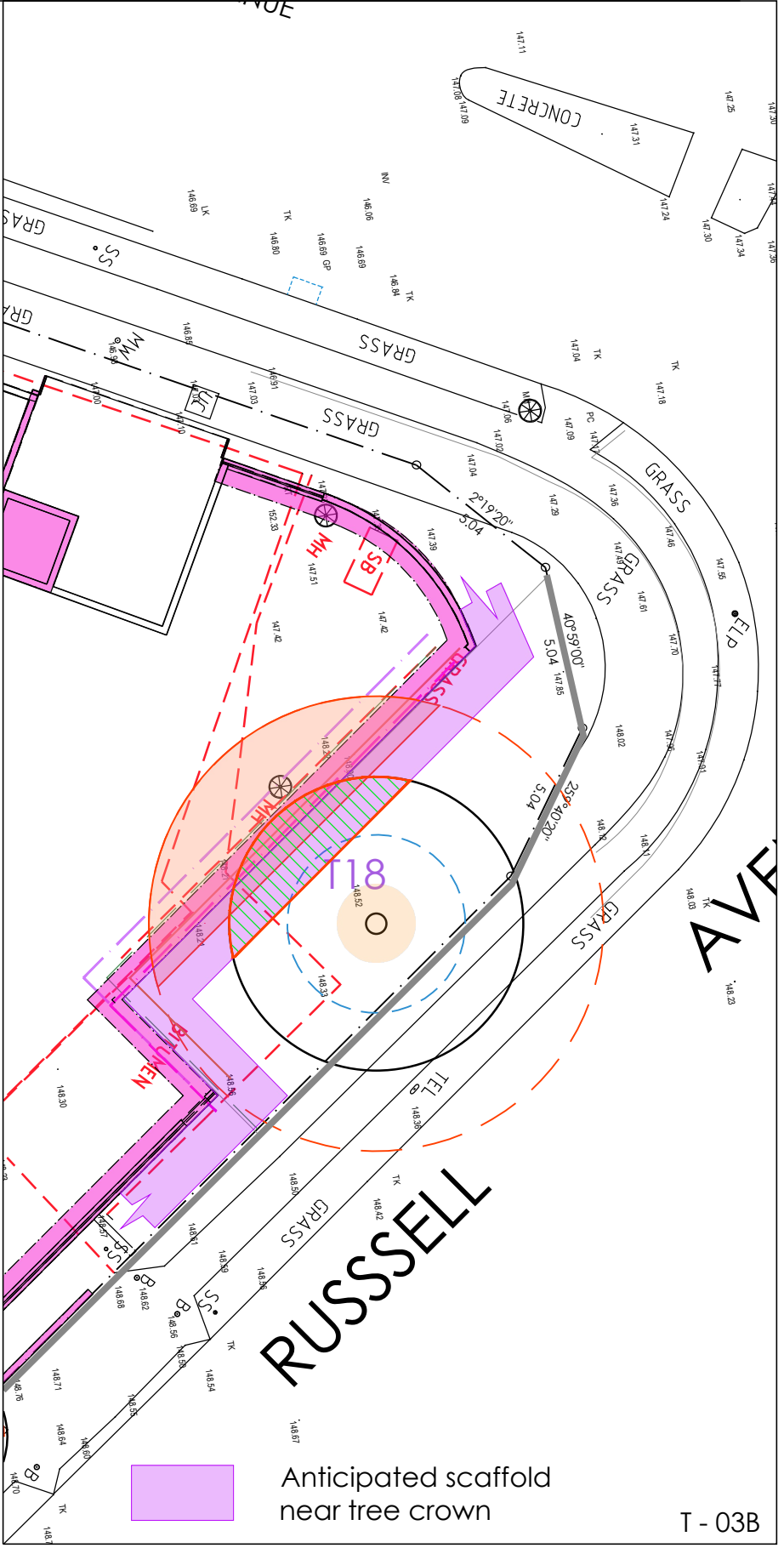
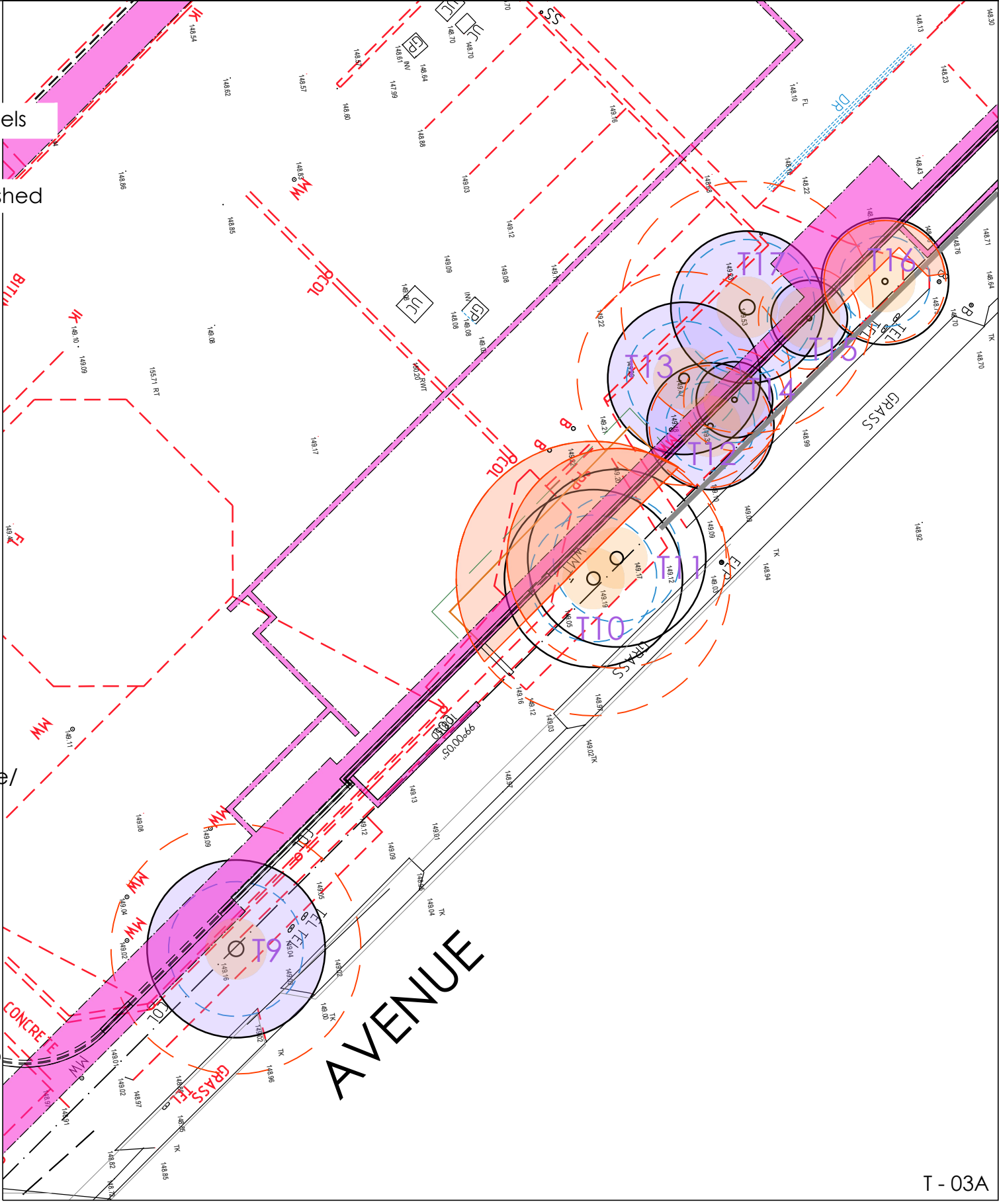
- Tree Protection Zone

Indicative crown spread

Existing tree

Structural Root Zone

Trunk diameter
- High significance tree
- Medium significance tree/
- Low significance tree
- Assessed tree within development footprint
- Cut - encroachment into Tree Protection Zone
- Encroachment into tree crown



REVISION	DESCRIPTION	DRAWN	CHECK	DATE
A	SUBMITTED TO CLIENT FOR COMMENT	AM	AS	07-06-21
B	SUBMITTED TO CLIENT FOR COMMENT - REVISED TREE DATA	AM	AS	13-07-21
C	SUBMITTED TO CLIENT FOR COMMENT - REVISED LAYOUT - DA	AM	AS	01-11-23

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PO Box 8136, Baulkham Hills, NSW 2153

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FORESTWAY SHOPPING CENTRE
WARRINGAH RD & FOREST WAY, FRENCHS FOREST

CLIENT

REVELOP

PROJECT

RETAIL REDEVELOPMENT

DRAWING

TREE LOCATION PLAN

SCALE

1:200 @ A3

ISSUE

DA

SHEET

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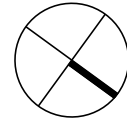
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REVISION

C



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, where D is the stem Diameter in metres:

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

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, Lower Branches 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.

Trunk and lower branch protection may be required to alleviate mechanical damage to a height of 3m. The minimum trunk protection shall consist of an initial padding layer beneath and battens consistent with *The Australian Standard for the Protection of Trees on Development Sites (AS 4970 – 2009), Section 4 and paragraph 4.5.2 and Figure 4*. The battens shall consist of lengths of 100 x 50mm (or varied to accommodate risk and tree structure) timber boards secured side by side, spaced 50mm apart with galvanised steel banding for the full circumference of the trunk without driving nails or screws into the trunk or branches. Trunk protection should be installed prior to any site works, maintained throughout the construction program and removed post construction.

Root protection may be required if site access and construction activities will not be able to be excluded from the entire TPZ as the installation of the tree protection fence is not reasonably practicable. Installation of root protection prior to the commencement of works to prevent the damage to roots such as i) Rumble boards as per section 4.5.3 - Ground protection and Figure 4 of AS4970 Protection of trees on development sites; or ii) construction of the above ground driveway.

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.

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 TPZ shall subject to the approval and supervision of the Project Arborist.

Excavation shall be executed by hand to avoid damage to roots by first excavating a narrow trench to the depth required. This will allow the location of woody structural roots greater than 40mm which can then be retained intact as necessary or pruned cleanly by and AQF level 3 Arborist or Horticulturalist. Final cut of roots should result in a clean cut, using appropriate tools as prescribed by the Australian Standard AS4970-2009 *Protection of trees on development sites*.

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 40mm in diameter.

Where roots 40mm 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*. A Pruning Specification Report may be required if pruning works are proposed.

Roots should be severed with clean sharp implement flush with the face of the excavation and maintained in a moist condition. Severing roots by earthmoving equipment is unacceptable as this results in tearing damage to roots, putting the tree at greater risk of root decay and/or structural instability. Root pruning shall be performed under the supervision of the Project Arborist.

If required, 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 as required.

Whilst work is being carried out by climbing arborists (AQF Level 3) an aerial inspection of stems, branches and their attachments should be made. If minor additional works are needed to remove or correct defects it should be done at that time. If significant defects are found requiring heavy pruning or whole tree removal, photos should be taken and an AQF Level 5 Arborist be consulted prior to work being done.

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

1. Committee EV-018 (2009) **AS 4970 - 2009 Protection of Trees on Development Sites**; Standards Australia.
2. Committee EV-018 (2007) **AS 4373 - 2007 Pruning of Amenity Trees**; Standards Australia.
3. Chapman, G.A, Murphy, C.L.; **Soil Landscapes of the Sydney 1:100 000 Sheet**; Soil Conservation Service of NSW, Sydney; 2004.
4. Henderson, L.; **Sydney Soil Landscape Series Sheet 9130**; NSW Department of Land and Water Conservation; 2004.
5. Fairley, A., Moore, P.; **Native Plants of the Sydney District an Identification Guide**; New Holland; Sydney; 2002.
6. Fakes, J.; **Arboriculture and Tree Care and Maintenance Notes**; TAFE NSW; 2004.
7. NSW Government, Office of Environment and Heritage, 2017, accessed 31.10.23, <http://www.environment.nsw.gov.au/eSpadeWebapp>
8. Benson, D, and Howell, J (1990) **'Taken for Granted: The bushland of Sydney and its suburbs'** Kangaroo Press in association with The Royal Botanic Gardens Sydney, NSW
9. Benson, D., & Howell, J.; **Natural Vegetation of the Sydney Area - 1:100,000 Map**; Royal Botanic Gardens Sydney; 1994.
10. Benson, D., & Howell, J.; **Natural Vegetation of the Sydney Area – Detailed Descriptions**; Cunninghamia Volume 3 (4), Royal Botanic Gardens Sydney, 1994.
11. OEH (2016) **The Native Vegetation of the Sydney Metropolitan Area. Volume 1: Technical Report. Version 3.0.** Office of Environment and Heritage Sydney.
12. OEH (2016) **The Native Vegetation of the Sydney Metropolitan Area. Volume 2: Vegetation Community Profiles. Version 3.0.** NSW Office of Environment and Heritage, Sydney.
13. Pellow, BJ, Henwood, MJ, and Carolin, RC (2009 5th ed.) **'Flora of the Sydney Region'** Sydney University Press, Sydney
14. Harris, R.W., Clark, J.R; & Matheny, N.P; **Arboriculture; Integrated Management of Landscape Trees, Shrubs & Vines 3rd Edition**; Prentice Hall, New Jersey; 1999.
15. Institute of Australian Consulting Arboriculturists (IACA); **IACA Significance of a Tree, Assessment Rating System (STARS)**; 2010.
16. Institute of Australian Consulting Arboriculturists (IACA); **Sustainable Retention Index Value (SRIV)**; Version 4; 2010.
17. Lonsdale, D.; **Principles of Tree Hazard Assessment and Management**; The Stationery Office; London; 2005.
18. Matheny, N.P. & Clark, J.R.; **Trees & Development: A Technical Guide to Preservation of Trees During Land Development**; International Society of Arboriculture, Savoy, Illinois 1998.
19. Mattheck, C (2002) **'Tree Mechanics Explained With Sensitive Words by Pauli the Bear'** Karlsruhe Research Centre, Karlsruhe.
20. Mattheck, Dr. Claus R., Breloer, Helge; **The Body Language of Trees - A Handbook for Failure Analysis 6th Edition**; The Stationery Office; London. England; 1994.
21. Robinson, L.; **Field Guide to the Native Plants of Sydney**; Kangaroo Press; Sydney; 1994.
22. Rowell, R.J (1991) **'Ornamental Flowering Trees in Australia'** New South Wales University Press, Kensington, NSW.
23. Shigo, A. L.; **Modern Arboriculture Touch Trees**; Shigo and Trees Associates; New Hampshire; 2003.