



Martin Peacock Tree Care
Arboricultural & Horticultural Consultancy

Billbergia Pty Ltd
25 Angas Street
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29th May 2026

Re: Response to Submissions – 88 Waterloo Road, Macquarie Park

This document has been prepared for Billbergia in response to City of Ryde Council Submission SSD-940006708 e. Tree Retention which states:

'Existing mature trees along site boundaries currently provide shade and environmental value. The provided tree removal and retention plan indicates that most trees will be removed. All mature trees should be retained to the street edge at both Cottonwood Crescent and Waterloo Rd. Council requires a detailed arborist report for the removal of any existing mature trees.'

Responses to the Council Submission are provided below:

Street trees T31, T32, T34 and T35 are to be removed due to either a direct conflict, or a Major Encroachment within their Notional Root Zone (NRZ) area (>20% - as defined by AS4970 Protection of trees on development sites) from the proposed driveway crossovers, or basement footprint. It is understood that the location of the driveways has been dictated by access requirements and therefore they cannot be relocated.

To offset tree removals and maintain the amenity and canopy cover within the streetscape, the Landscape Plans include the planting of seven (7) advanced size street trees.

Reserve trees 38 (weed species) and 39 (low value shrub) are to be removed due to a Major Encroachment within the NRZ area from the proposed basement footprint.

The design of the building footprint has been revised following submission of the SSDA. The current, proposal includes an increased basement set back on the western boundary which will allow for the retention of the neighbours tree T44.

It is understood that the retention of additional trees along the Cottonwood Crescent boundary of the site will not be possible due to design constraints. These trees have relatively large NRZ areas and setting back of the basement footprint to the extent that the trees could be retained would impact the developability of the site.



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In response to submissions, with the exception of Trees T47, T54 and T59, the trees along the Waterloo Road boundary and within the nature strip in Waterloo Road are now being retained.

Tree T47 is in poor health and exhibits signs of significant decline, which reduces its useful lifespan and leaves the trees more sensitive to any disturbance within the root zone. It is unlikely that the tree would survive development works associated with the installation of the proposed stairs within its NRZ area.

Tree 54 cannot be retained due to conflict with the proposed pavement/building access. This tree is a small, low value specimen that is considered easily replaceable.

Tree T59 cannot be retained due to level changes at the interface between the site and the Reserve. This tree is in fair health and structural condition and has been colonised by termites.

In summary, the previous scheme had proposed the removal of forty-nine (49) trees. The revised scheme proposes the removal of forty-five (45) trees, including thirty-eight (38) trees on site and seven (7) trees outside of the site boundary within the reserve/verge.

The Arboricultural Impact Assessment Report (Rev C dated 26.06.26) prepared for the SSDA has been prepared in accordance with *Australian Standard: AS4970 (2025) Protection of trees on development sites*. The report includes a detailed tree assessment undertaken in accordance with the industry standard Visual Tree Assessment methodology (refer section 6.0 Results), and an assessment of the impact of the proposal upon individual trees (refer section 8.0 Discussion). Where trees are identified for retention a specification for tree protection measures and the use of tree sensitive construction methods has been included in the report (refer section 9.0 Recommendations).

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Arboricultural Impact Assessment Report (Revision C)

88 Waterloo Road
Macquarie Park
NSW

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1.0 Summary

1.1 This Arboricultural Impact Assessment Report has been prepared on behalf of Cottonwood Development Pty Ltd as part of the State Significant Development Application (SSD-94006708) for the redevelopment of 15-21 Cottonwood Crescent, Macquarie Park (the site).

1.2 This application seeks development consent for the redevelopment of the site, a residential development comprising two residential flat buildings above a common basement car park / sleaved podium incorporating residential, car parking, and a retail component within the Waterloo Road frontage.

Specifically, this application seeks approval for the following:

- Demolition of all existing four-storey residential flat buildings on the site
- Site preparation works including:
 - Removal of existing trees
 - Excavation of the site to a maximum depth of six basement levels
- Construction of two mixed-use development of 60 and 52 Storeys, which will accommodate:
 - 858 Residential apartments inclusion 10% affordable housing of the uplift
 - Six (6) levels of basement with car parking spaces, bicycle parking, services
- A four-level commercial podium containing:
 - Retail spaces
 - Townhouses
 - Residential lobbies
 - Waste Storages
 - Residential and visitor Parking spaces
 - Bicycle Parking spaces
 - Communal Open Space and residential amenities on level four (4)
 - Rooftop Terrace on Level 52 of Cottonwood Crescent Tower and level 60 of Waterloo Road Tower

1.3 Tree Protection Zone areas are to be established to protect the retained trees during the construction stage of the project, and tree sensitive methods are to be utilised when working within TPZ areas.

1.4 To maintain canopy cover within the site and streetscape the proposal includes the planting of seventy (70) advanced size trees (plus advanced size tree ferns) in deep soil areas, in on-structure garden beds and within the street.

2.0 Introduction

- 2.1 This Arboricultural Impact Assessment Report has been prepared on behalf of Cottonwood Development Pty Ltd as part of the State Significant Development Application (SSD-94006708) for the redevelopment of 15-21 Cottonwood Crescent, Macquarie Park (the site).
- 2.2 This Report provides an assessment of forty-six (46) trees growing at the site, plus an additional sixteen (16) trees growing in the street, Council reserve and neighbouring property.
- 2.3 Martin Peacock (Martin Peacock Tree Care) visited the site on the 3rd of April 2026 and assessed the trees and their growing environment.

3.0 Scope of The Report

- 3.1 This report has been prepared to meet the following objectives:
- Conduct at ground level, a visual inspection of the subject tree(s) and their growing environment.
 - Assess the physiological and structural condition of the subject tree(s).
 - Determine the useful life expectancy, quality and value(s) of the subject tree(s).
 - Award a retention category for the subject tree(s).
 - Assess relevant plans and documentation to determine the potential impacts of the proposed development upon the subject tree(s).
 - Make recommendations for retention, removal or remedial works to the subject tree(s), and/or implementation of tree protection measures as appropriate.
- 3.2 The following plans/documentation were reviewed as part of the preparation of this report:
- Detail & Level Survey (Issue 1), dated 25.05.23 – prepared by CMS Surveyors
 - Architectural Plans DA0000 – DA6101 (Rev B), dated 23.06.26 – prepared by AJC
 - Landscape Plans LA000 – LA911 (Issue A), dated 25.06.26 – prepared by Place Design Group

These plans should be referenced when reading this Report.

4.0 Caveats & Limitations

- 4.1 The subject trees were inspected from the ground only, using the methodology detailed in this Report. The findings of this Report are based on the observations made at the time of inspection and from the information contained within the supplied plans/documentation.

The report reflects the subject trees as found on the day of inspection. There is no warranty or guarantee, expressed or implied, that problems or deficiencies with the site or the subject trees may not arise in the future. Any changes to development proposals or tree management works beyond those recommended in this report may alter the findings of the report.

5.0 Methodology

5.1 Data Collection:

The methodology used in this report follows the procedures detailed in *Australian Standard: AS 4970—2025. Protection of Trees on Development Sites*. This report also references the *British Standard BS: 5837 (2005) Trees in Relation to Construction – Recommendations*.

The methodology used in this report provides the following information:

1. Tree species - botanical and common name.
2. Age class - Juvenile, semi-mature, mature, senescent.
3. DSH – Diameter at Standard Height (mm)*
4. Height – estimated total height (m)
5. Crown spread – estimated, average radial crown spread in meters (m)
6. Physiological condition - good, fair, poor
7. Structural condition - good, fair, poor
8. Useful Life Expectancy - <5, 5–15, 15–40, >40 (years)**
9. Quality & Value – A, B, C, D ***
10. Retention Category - Priority for Retention, Consider for Retention, Consider for Removal, Priority for Removal****
11. SRZ – Structural Root Zone radius (m)
12. NRZ – Notional Root Zone radius (m)
13. Comments / Preliminary Management Recommendations

- 5.2 *DSH (Diameter at Standard Height) - Stem /trunk diameter measured at 1.4m above ground level. On sloping ground, measurements will be taken at the mid slope point at the base of the tree. Where a tree stem / trunk begins to branch at a point that is less than 1.4m above ground, a combined stem diameter is calculated using the formula:
Total DSH = $\sqrt{DSH^2 + DSH^2 + DSH^2}$

- 5.3 **Useful Life Expectancy – The estimated lifespan of the tree over which it will positively contribute to the amenity of the area and to the local environment, in a safe, healthy condition.

- 5.4 ***Quality & Value – The quality of the tree when compared to an idealised example of the species and the values which the tree provides to the site and local area (see Appendix D – Cascade Chart for Assessment of Tree Quality & Value).

- 5.5 ****Retention Category – The subject tree is allocated one of four categories based on a combination of its Quality and Value and Useful Life Expectancy. A certain amount of flexibility may be allowed when allocating a Retention Category, to take into account tree species, significance and site/environmental conditions.

- 5.6 An assessment of the trees condition is made using the Visual Tree Assessment (VTA) method (Mattheck & Breoler, 1994).

- 5.7 Tree assessment results are recorded in the Tree Assessment Schedule (see section 6.0 Results).

6.0 Results

Tree Assessment Schedule

Site: 15-21 Cottonwood Crescent, Macquarie Park, NSW

Date of survey: 03.04.26

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health	Structure	Comments	Age Class	ULE (years)	L/Sign	Retention Value	Radial TPZ (m)	Radial SRZ (m)
T1	<i>Agonis flexuosa</i> (Willow Myrtle)	700	10	5	Fair	Poor	Crown density 25-50%. Bark inclusion(s), major. Wound(s) with fungal brackets.	Late Mature	<5	Moderate	Priority for Removal	8.4	3.0
T2	<i>Leptospermum petersonii</i> (Lemon Scented Tea Tree)	175	6	4	Good	Fair	Heavily suppressed. Wound(s), early signs of decay. Poor form.	Late Mature	15-40	Low	Consider for Removal	2.1	1.7
T3							Tree Removed						
T4	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	250	6	3	Good	Fair	Trunk leaning on boundary fence	Mature	5-15	Low	Consider for Removal	3.0	1.9
T5	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	200	7	4	Good	Fair	Trunk lean, previous root plate movement, now stable.	Mature	5-15	Low	Consider for Removal	2.4	1.8

T6	<i>Cyathea cooperi</i> (Scaly Tree Fern)	125	4	2	Good	Good	n/a	Mature	15-40	Low	Consider for Removal	2.0	1.5
T7	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	125	7	3	Poor	Fair	Crown density 0-25%. Wound(s), advanced stages of decay.	Senescent	<5	Low	Priority for Removal	2.0	1.5
T8	<i>Eucalyptus sideroxylon</i> (Red Ironbark)	450	14	6	Fair	Good	Crown density 0-25%. in moderate volumes. Small (<25mmØ) epicormic growth	Mature	5-15	Moderate	Consider for Removal	5.4	2.5
T9	<i>Corymbia maculata</i> (Spotted Gum)	550	20	8	Good	Good	Growing to rear of retaining wall	Mature	15-40	Moderate	Consider for Retention	6.6	2.7
T10	<i>Eucalyptus sideroxylon</i> (Red Ironbark)	350	7	5	Poor	Fair	Crown density 0-25%. Heavily suppressed. Wound(s), various stages of decay. Trunk cavity(s), minor.	Mature	<5	Low	Priority for Removal	4.2	2.2
T11	<i>Corymbia maculata</i> (Spotted Gum)	250	13	3	Good	Good	Trunk contact with T10. Growing to rear of retaining wall. Partially suppressed.	Semi-mature	15-40	Low	Consider for Removal	3.0	1.9
T12	<i>Eucalyptus sideroxylon</i> (Red Ironbark)	350	10	7	Fair	Good	Crown density 25-50%. Partially suppressed.	Mature	5-15	Moderate	Consider for Removal	4.2	2.2
T13	<i>Corymbia maculata</i> (Spotted Gum)	475	18	5	Good	Good	Growing to rear of retaining wall	Mature	15-40	Moderate	Consider for Retention	5.7	2.5

T14	<i>Corymbia maculata</i> (Spotted Gum)	625	22	9	Good	Good	Growing to rear of retaining wall	Mature	15-40	High	Priority for Retention	7.5	2.8
T15	<i>Eucalyptus botryoides</i> (Bangalay)	550	13	8	Good	Good	Crown density 75-95%. Small (<25mmø) & medium (25-75mmø) epicormic growth in moderate volumes. Wound(s), various stages of decay. Termites.	Mature	15-40	Moderate	Consider for Retention	6.6	2.7
T16	<i>Eucalyptus botryoides</i> (Bangalay)	450	12	9	Poor	Fair	Crown density 0-25%. Small (<25mmø) epicormic growth in moderate volumes. Termites.	Mature	<5	Moderate	Priority for Removal	5.4	2.5
T17	<i>Eucalyptus punctata</i> (Grey Gum)	550	18	9	Good	Fair	Crown density 75-95%. Partially suppressed. Termites.	Mature	15-40	Moderate	Consider for Retention	6.6	2.7
T18	<i>Eucalyptus punctata</i> (Grey Gum)	650	18	10	Good	Good	Crown density 75-95%. Adaptive growth.	Mature	15-40	Moderate	Consider for Retention	7.8	2.9
T19	<i>Eucalyptus viminalis</i> (Ribbon Gum)	550	20	6	Good	Good	Partially suppressed.	Mature	15-40	Moderate	Consider for Retention	6.6	2.7

T20	<i>Eucalyptus grandis</i> (Flooded Gum)	575	19	7	Good	Good	Crown density 75-95%. Medium (25-75mmø) & large (>75mmø) deadwood in moderate volumes. Partially suppressed.	Mature	15-40	Moderate	Consider for Retention	6.9	2.7
T21							Dead						
T22	<i>Juniperus sp.</i> (Juniper)	200	6	2	Fair	Fair	Crown density 50-75%. Co-dominant inclusions, minor.	Mature	5-15	Low	Consider for Removal	2.4	1.8
T23	<i>Corymbia maculata</i> (Spotted Gum)	725	25	6	Good	Good	Kino exudate at basal flare	Mature	15-40	High	Priority for Retention	8.7	3.0
T24	<i>Quercus robur</i> (English Oak)	400	10	5	Fair	Good	n/a	Mature	5-15	Moderate	Consider for Removal	4.8	2.3
T25	<i>Eucalyptus punctata</i> (Grey Gum)	650	20	6	Good	Good	n/a	Mature	15-40	High	Priority for Retention	7.8	2.9
T26	<i>Eucalyptus punctata</i> (Grey Gum)	500	18	7	Fair	Good	Crown density 75-95%. Partially suppressed.	Mature	15-40	Moderate	Consider for Retention	6.0	2.6
T27	<i>Corymbia citriodora</i> (Lemon Scented Gum)	375	13	5	Fair	Good	Crown density 50-75%.	Mature	15-40	Moderate	Consider for Retention	4.5	2.3

T28	<i>Corymbia maculata</i> (Spotted Gum)	550	18	9	Good	Good	Medium (25-75mmø) & large (>75mmø) deadwood in low volumes. Partially suppressed.	Mature	15-40	Moderate	Consider for Retention	6.6	2.7
T29	<i>Corymbia maculata</i> (Spotted Gum)	275	7	5	Poor	Fair	Heavily suppressed. Poor form. Canker/gall/burl.	Mature	<5	Low	Priority for Removal	3.3	2.0
T30	<i>Corymbia maculata</i> (Spotted Gum)	425	18	6	Good	Good	Crown density 75-95%. Partially suppressed.	Mature	15-40	Moderate	Consider for Retention	5.1	2.4
T31	<i>Melaleuca quinquenervia</i> (Broad Leaved Paperbark)	450	9	5	Good	Good	Council street tree.	Mature	15-40	Moderate	Consider for Retention	5.5	2.5
T32	<i>Jacaranda mimosifolia</i> (Jacaranda)	175	5	3	Good	Good	Council street tree.	Early mature	15-40	Low	Consider for Removal	2.1	1.7
T33	<i>Lophostemon confertus</i> (Brush Box)	375	7	4	Good	Good	Council street tree	Mature	15-40	Moderate	Consider for Retention	4.5	2.3
T34	<i>Lophostemon confertus</i> (Brush Box)	325	7	4	Good	Good	Council street tree	Mature	15-40	Moderate	Consider for Retention	3.9	2.1
T35	<i>Lophostemon confertus</i> (Brush Box)	375	7	4	Good	Good	Council street tree	Mature	15-40	Moderate	Consider for Retention	4.7	2.3

T36							Tree removed						
T37	<i>Corymbia maculata</i> (Spotted Gum)	425	8	4	Good	Good	Council street tree	Mature	15-40	Moderate	Consider for Retention	5.1	2.4
T38	<i>Cotoneaster sp.</i> (Cotoneaster)	300	3	3	Good	Good	Located in Council reserve. Weed species	Mature	<5	Low	Priority for Removal	3.6	2.1
T39	<i>Acacia sp.</i> (Wattle)	100	3	2	Good	Good	Located in Council reserve	Mature	5-15	Low	Consider for Removal	2.0	1.5
T40	<i>Melaleuca stypheloides</i> (Prickly Leaved Paperbark)	700	12	5	Good	Good	Located in Council reserve	Mature	15-40	Moderate	Consider for Retention	8.4	3.0
T41	<i>Casuarina glauca</i> (Swamp She Oak)	225	6	2	Good	Good	Located in Council reserve. Partially suppressed.	Semi mature	15-40	Low	Consider for Removal	2.8	1.9
T42	<i>Casuarina glauca</i> (Swamp She Oak)	225	6	2	Good	Good	Located in Council reserve. Partially suppressed.	Semi mature	15-40	Low	Consider for Removal	2.8	1.9
T43	<i>Casuarina glauca</i> (Swamp She Oak)	225	6	2	Good	Good	Located in Council reserve. Partially suppressed.	Semi mature	15-40	Low	Retain - outside of site	2.8	1.9
T44	<i>Citharexylum spinosum</i> (Fiddlewood Tree)	500	16	6	Good	Good	Located in no. 13 Cottonwood Crescent.	Mature	15-40	Moderate	Consider for Retention	6.0	2.6

T45	<i>Corymbia maculata</i> (Spotted Gum)	600	22	9	Good	Good	Crown density 75-95%. Small (<25mmø) & medium (25-75mmø) deadwood in low volumes. Partially suppressed.	Mature	15-40	Moderate	Consider for Retention	7.2	2.8
T45A	<i>Corymbia maculata</i> (Spotted Gum)	200	9	3	Fair	Fair	Crown density 25-50%. Heavily suppressed. Poor form.	Semi Mature	5-15	Low	Consider for Removal	2.4	1.8
T46	<i>Corymbia maculata</i> (Spotted Gum)	400	20	8	Good	Good	Small (<25mmø) & medium (25-75mmø) deadwood in low volumes. Partially suppressed.	Mature	15-40	Moderate	Consider for Retention	4.8	2.3
T47	<i>Corymbia maculata</i> (Spotted Gum)	400	10	5	Poor	Fair	Crown density 0-25%. Partially suppressed. Poor form.	Mature	<5	Low	Priority for Removal	4.8	2.3
T48	<i>Corymbia maculata</i> (Spotted Gum)	400	18	4	Good	Good	Partially suppressed.	Mature	15-40	Moderate	Consider for Retention	4.8	2.3
T49	<i>Corymbia maculata</i> (Spotted Gum)	450	16	5	Good	Good	Crown density 75-95%. Small (<25mmø) epicormic growth in low volumes. Partially suppressed.	Mature	15-40	Moderate	Consider for Retention	5.4	2.5

T50	<i>Corymbia maculata</i> (Spotted Gum)	325	14	6	Fair	Good	Crown density 50-75%. Small (<25mmØ) epicormic growth in moderate volumes. Partially suppressed.	Mature	5-15	Moderate	Consider for Removal	3.9	2.1
T51	<i>Melaleuca quinquenervia</i> (Broad Leaved Paperbark)	375	8	5	Fair	Good	Crown density 25-50%. Partially suppressed. Phototrophic lean, slight.	Mature	5-15	Moderate	Consider for Retention	4.5	2.3
T52	<i>Melaleuca quinquenervia</i> (Broad Leaved Paperbark)	675	11	6	Good	Fair	Crown density 50-75%. Partially suppressed. Co-dominant inclusions, minor.	Mature	15-40	Moderate	Consider for Retention	8.2	2.9
T53	<i>Brachychiton acerifolius</i> (Illawarra Flame tree)	350	9	4	Fair	Good	Crown density 25-50%. Partially suppressed. Poor form.	Semi-mature	5-15	Low	Consider for Removal	4.2	2.2
T54	<i>Banksia integrifolia</i> (Coastal Banksia)	200	6	3	Good	Good	Partially suppressed.	Mature	15-40	Low	Consider for Removal	2.4	1.8
T55	<i>Casuarina cunninghamiana</i> (River She Oak)	600	17	8	Good	Good	Crown density 75-95%. Partially suppressed. Wound(s), various stages of decay. Previous branch failure(s).	Mature	15-40	Moderate	Consider for Retention	7.2	2.8

T56	<i>Casuarina cunninghamiana</i> (River She Oak)	600	17	8	Good	Good	Crown density 75-95%. Partially suppressed. Wound(s), various stages of decay.	Mature	15-40	Moderate	Consider for Retention	7.2	2.8
T57	<i>Casuarina cunninghamiana</i> (River She Oak)	200	6	6	Good	Fair	Heavily suppressed. Poor form.	Semi-mature	5-15	Low	Consider for Removal	2.4	1.8
T58	<i>Eucalyptus botryoides</i> (Bangalay)	600	20	7	Good	Fair	Small (<25mmø) & medium (25-75mmø) deadwood in low volumes. Small (<25mmø) epicormic growth in low volumes. Termites.	Mature	15-40	Moderate	Consider for Retention	7.3	2.8
T59	<i>Eucalyptus botryoides</i> (Bangalay)	325	9	9	Fair	Fair	Crown density 50-75%. Small (<25mmø) & large (>75mmø) deadwood in low volumes. Partially suppressed. Poor form. Phototrophic lean, slight. Termites.	Mature	5-15	Moderate	Consider for Removal	3.9	2.1
T60	<i>Acer negundo</i> (Box Elder)	425	9	6	Fair	Fair	Crown density 25-50%. Small (<25mmø) deadwood in moderate volumes. Partially suppressed. Wound(s), advanced stages of decay.	Mature	5-15	Low	Consider for Removal	5.1	2.4

T61	<i>Jacaranda mimosifolia</i> (Jacaranda)	275	8	5	Fair	Good	Crown density 25-50%. Localised crown death. Heavily suppressed. Poor form.	Mature	5-15	Low	Consider for Removal	3.3	2.0
T62	<i>Corymbia maculata</i> (Spotted Gum)	400	18	6	Good	Good	Located in Council reserve	Mature	15-40	Moderate	Consider for Retention	4.8	2.3
T63	<i>Callistemon citrinus</i> (Lemon Scented Bottlebrush)	250	3	3	Good	Fair	Council street tree	Mature	5-15	Low	Consider for Removal	3.0	1.9
T64	<i>Leptospermum petersonii</i> (Lemon Scented Tea Tree)	225	3	2	Fair	Fair	Council street tree	Mature	5-15	Low	Consider for Removal	2.6	1.8

7.0 Observations

- 7.1 The trees growing within the site have been assessed in accordance with *Australian Standard AS4970 (2025) Protection of trees on development sites* (AS4970) to determine their; condition, quality and value(s), Useful Life Expectancy and to allocate a Retention Category. Full details of the trees assessment are listed in 6.1 Results - Tree Assessment Schedule.
- 7.2 The allocation of a Retention Category is a requirement of AS4970 and provides an overview of the quality and value of trees only. Retention Categories are intended to inform the design process and do not take into account design considerations/constraints relating to the development proposal.

It should be noted that the Retention Categories allocated in this report are not a schedule for tree removal or retention

7.3 Trees Proposed for Retention (within the site)

Trees T48–T53, T55–T58 are proposed for retention. The table below provides a summary of the trees' quality and value and Retention Category:

Quality & Value	Retention Category	Tree no.
A - High	Priority for Retention	-
B - Moderate	Consider for Retention	T48, T49, T50, T51, T52, T55, T56, T58
C - Low	Consider for Removal	T53, T57
D – Not suitable for Retention	Priority for Removal	-

Tree T48 will be subject to a Minor Encroachment (<10% - as defined by AS4970) within its NRZ area from development works. A Minor Encroachment should not significantly impact the tree and does not require the use of tree sensitive design or construction methods.

Trees T49–T53 and T55–T58 will be subject to Major Encroachment (>20% as defined by AS4970) within their NRZ areas from various elements of the development proposal (refer – 8.0 Discussion). Tree sensitive design has been utilised in the design development stage to minimise the impact of encroachment upon the trees. During the construction stage of the project tree sensitive methods will be required when working within the NRZ areas.

7.4 Trees Proposed for Removal (within the site)

Trees T1–T30, T45–T47, T54 and T59–T61 are proposed for removal. The table below provides a summary of the trees' quality and value and Retention Category:

Quality & Value	Retention Category	Tree no.
A - High	Priority for Retention	T14, T23, T25
B - Moderate	Consider for Retention	T8, T9, T12, T13, T15, T17, T18, T19, T20, T26, T27, T28, T30, T45, T46, T51

C - Low	Consider for Removal	T2, T4, T5, T6, T11, T12, T22, T24, T45A, T54, T57, T59, T60, T61
D – Not suitable for Retention	Priority for Removal	T1, T7, T10, T16, T29

The trees proposed for removal predominantly fall within the proposed building footprint or will be subject to Major Encroachment within the NRZ areas to the extent that the trees cannot be retained.

Tree T47 appears to be in a state of irreversible decline and is no longer viable for retention.

It should be noted that Trees T3 and T21 have died since the initial tree assessment that was undertaken in the early stages of the project. Tree T3 has been removed and Tree T21 remains.

7.5 Trees Outside of The Site

Trees T31 – T35, T37, T63 and T64 are street trees growing in the nature strips on Cottonwood Crescent and Waterloo Road. Trees T38-T43 and T62 are growing within Elouera Reserve and Tree T44 is growing within the neighbouring property.

Trees T33, T37, T40-T44 and T62-T64 are proposed for retention. The table below provides a summary of the trees' quality and value and Retention Category:

Quality & Value	Retention Category	Tree no.
A - High	Priority for Retention	-
B - Moderate	Consider for Retention	T33, T37, T40, T44, T62
C - Low	Consider for Removal	T41, T42, T43, T63, T64
D – Not suitable for Retention	Priority for Removal	-

Trees T40, T44 and T62 will be subject to Moderate Encroachment (10-20% - as defined by AS4970) within their NRZ areas from development works. As the proposed development works will be located on one side of the trees' NRZ areas only, a Moderate Encroachment should not significantly impact the trees. To minimise the impact of development, the use of tree sensitive construction methods will be required when working within the NRZ areas.

Trees T33, T37, T41-T43, T63 and T64 will be subject to Major Encroachment (>20% - as defined by AS4970) within their NRZ areas from various elements of the development proposal (refer – 8.0 Discussion). Tree sensitive design has been utilised in the design development stage to minimise the impact of encroachment upon the trees. During the construction stage of the project tree sensitive methods will be required when working within the NRZ areas.

Trees T31, T32, T34, T35, T38 and T39 are proposed for removal. The table below provides a summary of the trees' quality and value and Retention Category:

Quality & Value	Retention Category	Tree no.
A - High	Priority for Retention	-
B - Moderate	Consider for Retention	T31, T34, T35
C - Low	Consider for Removal	T32, T38, T39
D – Not suitable for Retention	Priority for Removal	T38

Trees T31 and T32 fall within the footprint of the proposed western driveway crossover. Trees T34 and T35 will be subject to a Major Encroachment within their NRZ areas from the proposed eastern driveway crossover and cannot be retained.

Tree T38 is an exotic weed species that has a propensity to self-seed and become invasive. This tree would be recommended for removal regardless of any development at the site.

Tree T39 is a small native tree/large shrub with low landscape value. The tree is proposed for removal to provide access between the site and the reserve.

It should be noted that Tree T36 (street tree) has been removed since the initial tree assessment that was undertaken in the early stages of the project.

8.0 Discussion

- 8.1 The development proposal includes the removal of thirty-eight (38) trees growing within the site, plus four (4) street trees and two (2) trees within the reserve. To offset tree removals and maintain canopy cover, the Landscape Plans include the planting of seventy (70) advanced size trees (plus advanced size tree ferns) in deep soil areas, in on-structure garden beds and within the street.
- 8.2 To minimise the impact of driveway ramp and retaining wall construction on Trees T33 and T44, preliminary root pruning within the trees' NRZ areas should be undertaken prior to bulk excavation.
- 8.3 The basement design has been developed to minimise the impact of piling of Trees T41-T43, with piles located at the perimeter of the trees' Structural Root Zone (SRZ) areas, and the capping beam modified to minimise excavation requirements within the NRZ.
- 8.4 Research shows that covering of a tree's root zone with large areas of impermeable surfaces increases carbon dioxide levels within the underlying soil profile, which can impact root function¹. Furthermore, impermeable surfaces and compaction of the soil profile reduces infiltration of rainfall and available oxygen, which are required for root development. Therefore, to optimise the growing environment for Trees T48-T53 and T55-T58 the

¹ British Standard BS5837 Trees in Relation to Design, Demolition and Construction to Construction - Recommendations

proposed paving within the trees' NRZ areas has been designed to be permeable and is to be predominantly suspended above existing ground level.

A small amount of excavation will be required where the proposed suspended pavement interfaces with the reserve and the footpath on Waterloo Road. As the excavation works will be located within the Structural Root Zone (SRZ) of Tree T58 and have the potential to impact the stability of the tree, it is proposed that at the time of construction, preliminary excavation and root assessment is undertaken. Where possible the design will be modified and/or minor root pruning undertaken allow for the retention of the tree. In the event that the works cannot be undertaken without potentially impacting the tree's stability, it is proposed that the tree is removed and replaced with an advanced size new tree.

- 8.5 A series of sandstone boulder walls and landscape walls are proposed within the NRZ areas of Trees T48-T53 and T55-T58. To minimise root impacts the boulder walls should be installed on ground with no footing, and the landscape walls should be installed on piered footings.
- 8.6 The development proposal includes footpath upgrades on Cottonwood Crescent and Waterloo Road. To minimise root impacts, within NRZ areas any existing subbase below the footpaths should be retained and reused.
- 8.7 To protect the retained trees during the construction stage of the project, the establishment of Tree Protection Zone (TPZ) areas will be required, and tree sensitive methods will be required when working within TPZ areas.

9.0 Recommendations

- 9.1 Trees T1-T32, T34, T35, T38, T39, T45-T47, T54 and T59-T61 are proposed for removal. Trees approved for removal shall be marked by the Project Arborist, and tree removals shall be undertaken by a qualified Arborist (minimum AQF level 3) covered by adequate Public Liability insurance. Arborists and ground staff shall comply with the *Work Cover Code of Practice for the Amenity Tree Industry*.

- 9.2 Prior to the commencement of demolition works, TPZ areas shall be established for Trees T33, T37, T40-T44, T48-T53, T55-T58 and T62-T64. Depending upon demolition and construction access requirements, the TPZ areas shall comprise either 1.8m high weld-mesh fencing, or trunk and ground protection, or a combination of both methods.

For trees growing within the site (Trees T48-T53, T55-T58) a combination of TPZ fencing and ground protection shall be installed.

For trees growing within the Council reserve and neighbouring property (Trees T40-T44) fenced TPZ areas shall be established for the sections of the trees' NRZ that extend into the site.

For street trees (T33, T37, T63 and T64) TPZ fencing shall be installed within the nature strip only to maintain footpath access and provide access for footpath replacement.

The Project Arborist shall meet on site with the Project Manager to determine tree specific TPZ requirements prior to installation.

Refer Appendix C – Establishment of Tree Protection Zones

- 9.3 To maintain soil moisture, drip irrigation and a 75mm thick layer of composted leaf litter mulch shall be installed within fenced TPZ areas, or as directed by the Project Arborist. The irrigation shall be operated via an automated timer with the frequency and duration specified by the Project Arborist. The pruning of roots greater than 25mm diameter within any TPZ area requires approval from the Project Arborist.

TPZ areas shall be maintained for the duration of the project and shall not be modified or used for the storage of demolition waste or construction materials. Fencing and ground protection may only be removed to provide for construction access following approval from the Project Arborist.

TPZ areas shall be inspected by the Project Arborist on a quarterly basis throughout the construction stage of the project, or as specified within the Conditions of Development Approval.

- 9.4 The existing pavements (including the public footpath) and structures in TPZ areas shall be carefully demolished in small sections, ensuring that the surrounding soil profile and sub grade remains undisturbed. Where possible, existing sub base layers, redundant footings and services should be left in situ. Machinery operators shall be guided by a spotter at all times to prevent tree damage (including roots).

Ground cover vegetation in TPZ areas shall be removed using hand tools only, and tree stumps shall be ground out rather than excavated to minimise disturbance of the surrounding soil profile.

- 9.5 Excavation for basement construction and the driveway ramp shall avoid over excavation, benching or battering within TPZ areas.

- 9.6 To prevent the tearing/shattering of roots prior to bulk excavation for the construction of the driveway crossover (Tree T33) and basement/ramp (Trees T40-T44), preliminary excavation and root pruning shall be undertaken, under the supervision/direction of the Project Arborist.

- 9.7 The suspended paving, stairs and landscape walls within TPZ areas shall be installed on piered footings. When locating piers, the upper 600mm of each pier hole shall be excavated by hand, and where roots greater than 25mm diameter are encountered the pier location shall be adjusted (unless root pruning is approved by the Project Arborist). Where required, pier holes shall be sleeved to prevent contact between roots and freshly poured concrete.

- 9.8 Excavation for the installation of paving within the NRZ/SRZ area of Tree T58 shall be undertaken using hand tools only under the supervision/direction of the Project Arborist. All significant roots (as determined by the project arborist) shall be retained and protected, and the pavement/substructure/subbase and finished levels modified to allow for the retention of roots. Where it is determined that the pavement cannot be installed without impacting the health and structural stability of the tree, it should be removed and replaced with an advanced size new tree.

- 9.9 Where possible, inground services shall be routed outside of TPZ areas. Where this cannot be achieved, trenches shall be excavated using one of the following tree sensitive methods:

- Hand excavation – trenches shall be excavated using hand tools only

- Hydrovac excavation - trenches shall be excavated using low water pressures and to avoid bark damage, the lance shall not be pointed directly at roots
- A combination of compact excavator/hand excavation – trenches shall be excavated using a compact excavator (<2T) fitted with a flat bladed bucket. Soil levels shall be lowered in small increments. The excavator operator shall be guided by a spotter at all times to identify and carefully expose roots

All roots >25mm diameter shall be retained and protected from sun damage and desiccation with a covering of geotextile fabric, pending assessment by the Project Arborist. Pipework/conduits shall be installed under or around roots >25mm diameter unless root pruning is approved by the Project Arborist.

- 9.10 A dual horizon soil profile shall be installed in all on structure planters/garden beds. The upper A Horizon shall comprise of a 300mm (max.) deep layer of a proprietary, planter box soil blend. At depths below 300mm the B Horizon shall comprise of an 80/20 washed river sand/screened topsoil blend. Soils shall be consolidated in 200mm layers at the time of installation to prevent settlement.
- 9.11 Within TPZ areas existing ground levels shall be generally maintained. Locally increasing ground levels through the installation of new soil/soil conditioners by up to 200mm is permissible within the NRZ. However, to avoid burying of tree root collars, existing levels within SRZ areas shall be maintained. Mechanical cultivation/ripping of soils in NRZ areas is not permissible.
- 9.12 New trees shall be grown and supplied in accordance with *AS:2303 2018 Tree stock for landscape use*. The planting and aftercare of the trees shall be undertaken by a qualified horticulturalist (minimum AQF level 3).
- 9.13 The recommendations of this report are subject to approval by the Consent Authority.



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Diploma Horticulture (Landscape Design) (AUS)



References

Australian Standard: *AS 4970 - 2009 Protection of trees on development sites*. Standards Australia GPO Box 476, Sydney, NSW, 2001.

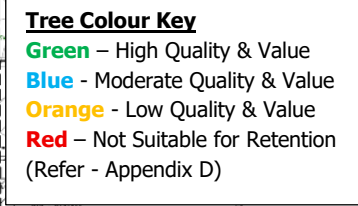
British Standard Institution (2005). *Guide for Trees in relation to construction*. BSI, 2 Park Street, London W1A 2BS.

Draper B.D. and Richards P.A. (2009), *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.

Tree Colour Key

- Green** – High Quality & Value
- Blue** - Moderate Quality & Value
- Orange** - Low Quality & Value
- Red** – Not Suitable for Retention (Refer - Appendix D)

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PRELIMINARY
HAS NOT BEEN CHECKED BY SURVEYOR

[illegible]

HORIZONTAL DATUM:
CC ORD NAD83 SYSTEM/ NGA OCEANOS GROUND
MARKS ADOP/ ED: 550 103444, 550 21030

VERTICAL DATUM:
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
RM: ADEPTE/ 550 106445
P.L. 50.251 (CLASS LC)

CLIENT:

LEGPRO 48 PTY LTD ATF LEGPRO 48 UNIT TRUST

BOUNDARY IDENTIFICATION
AND DETAIL & LEVEL SURVEY
OVER SP78930, SP7892, SP7984 & SP8144
No.15-21 COTTONWOOD CRESCENT

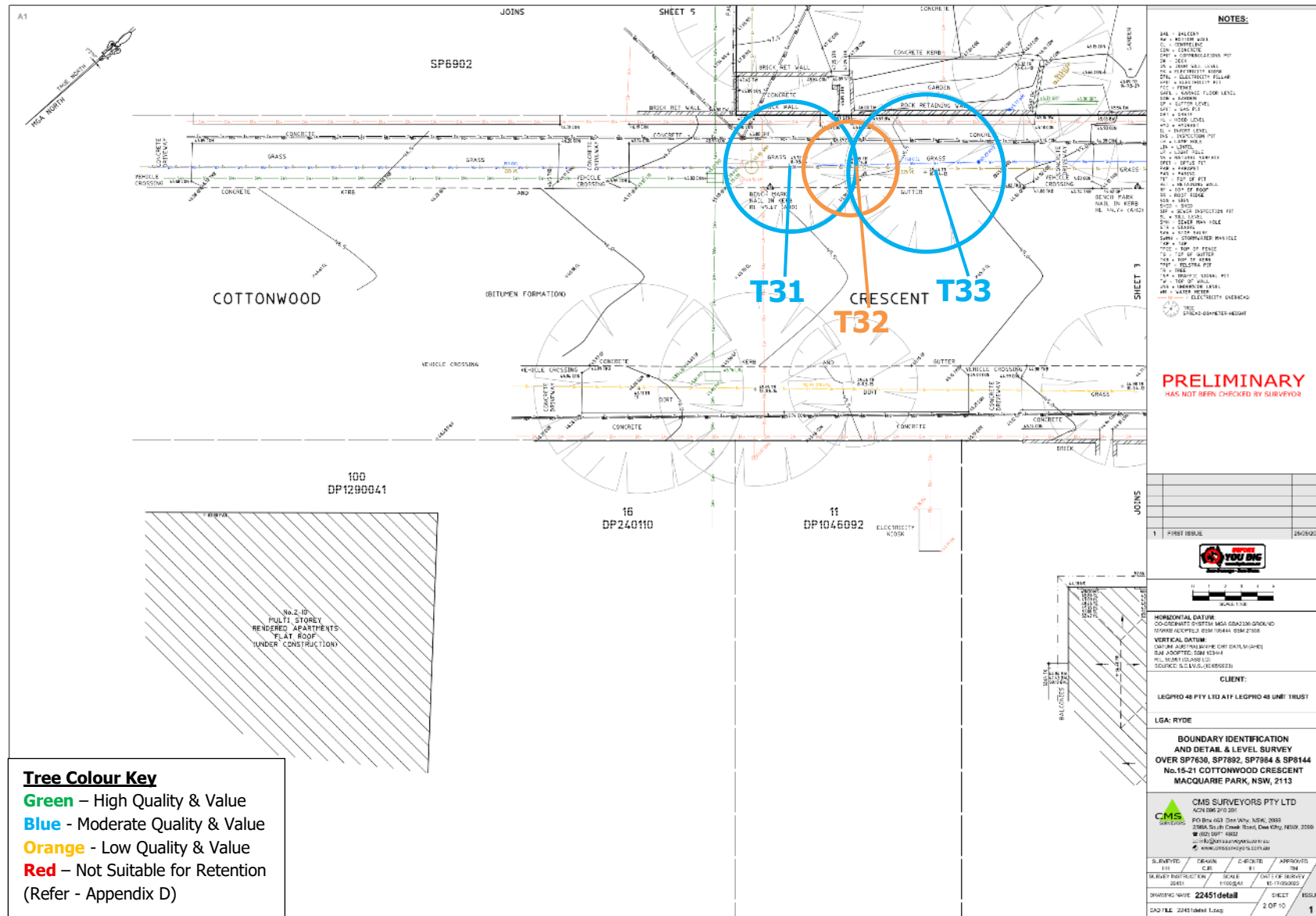
MACQUARIE PARK, NSW, 2113

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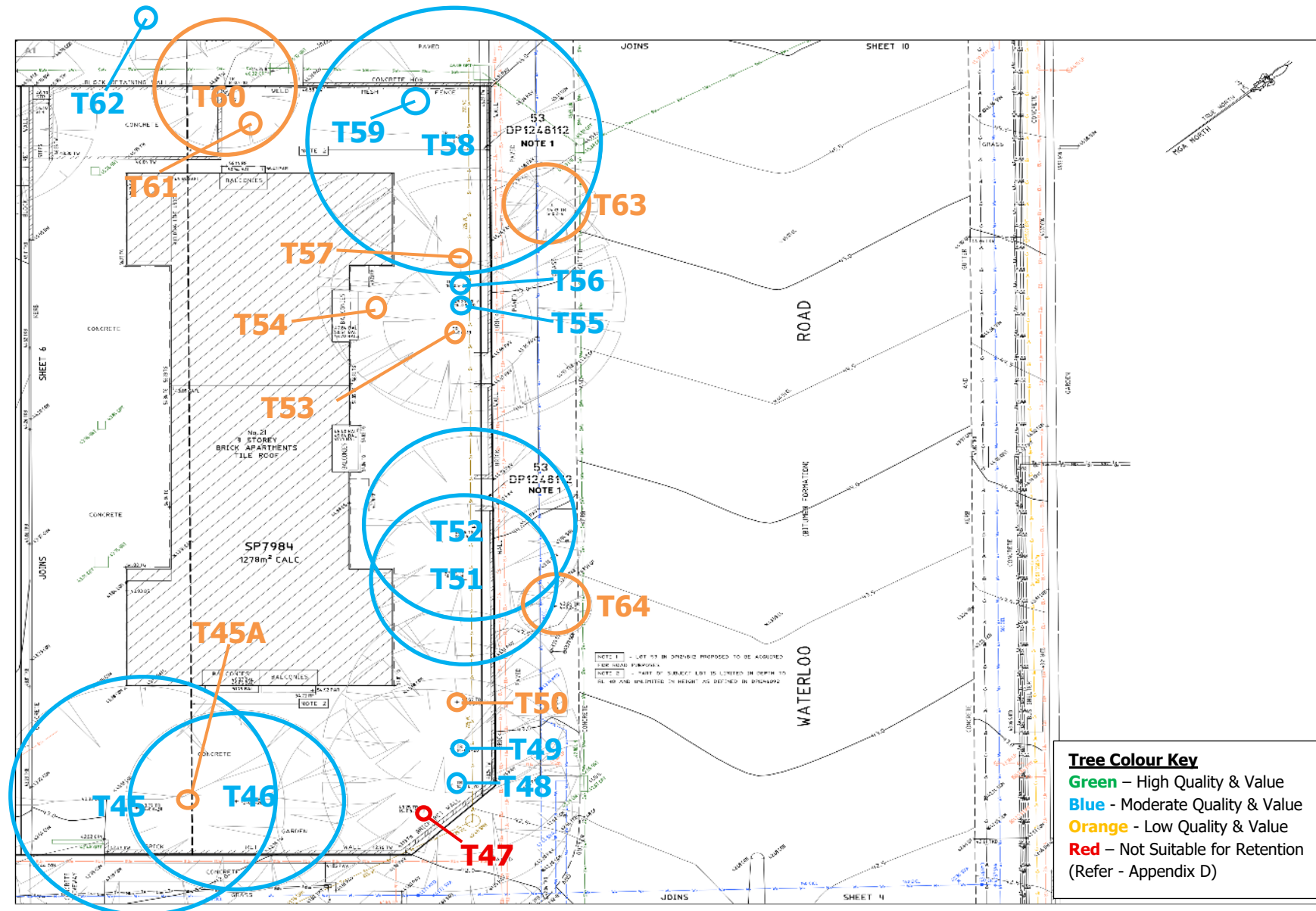
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CAD FILE 22451detail.dwg			

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Appendix B – Figures



1: Tree T1



2: Trees T4 & T5



3: Trees T8-T11



4: Trees T20-T21



5: Tree T26



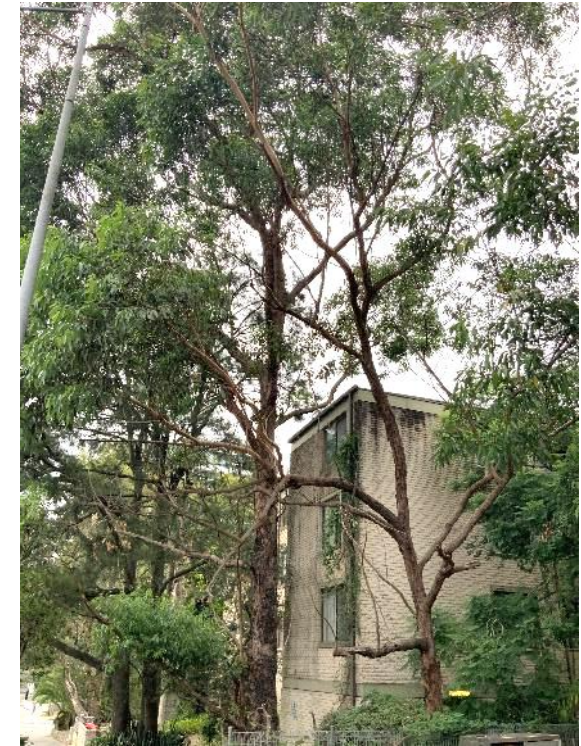
6: Trees T28-T30



7: Trees T45-T46

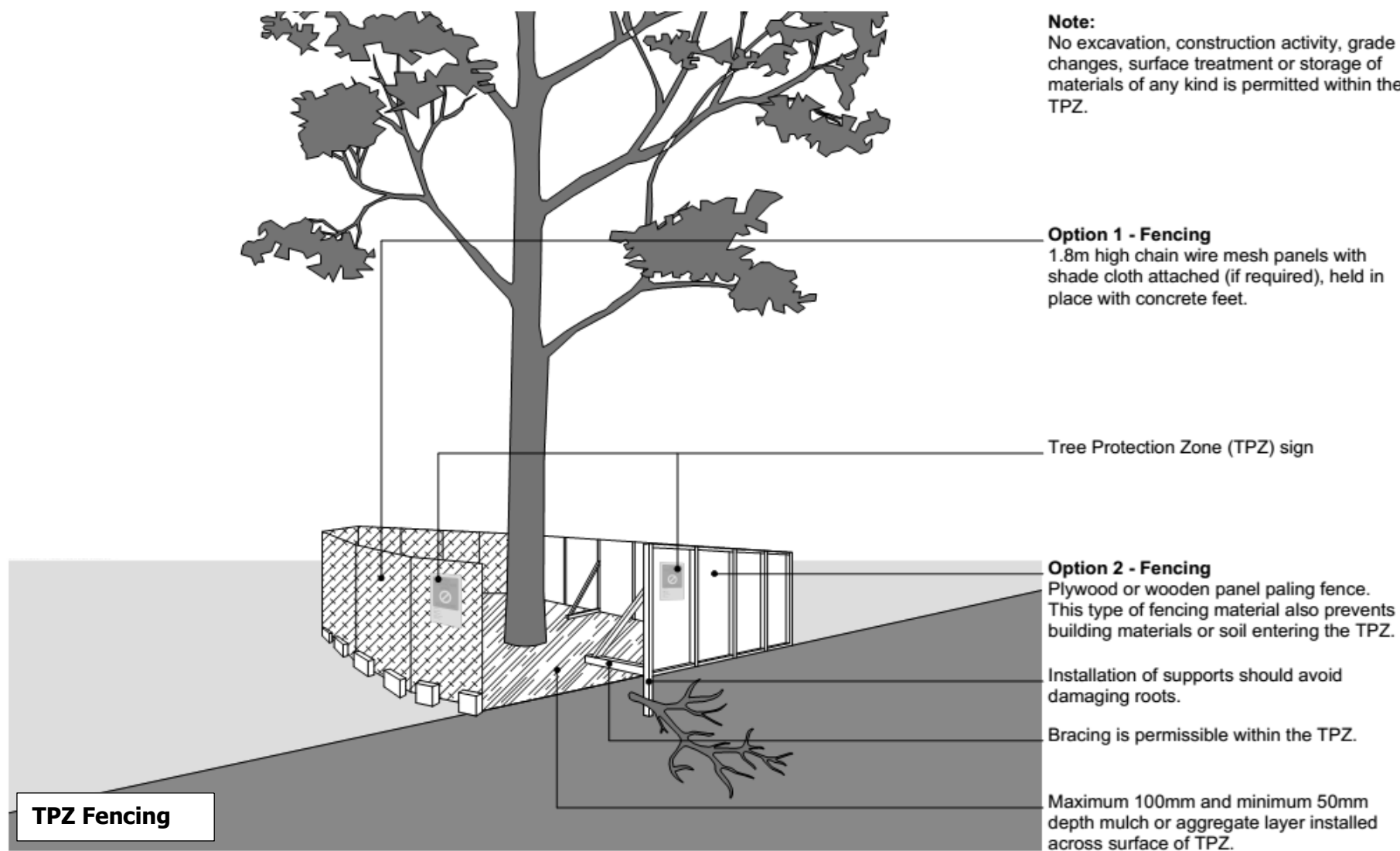


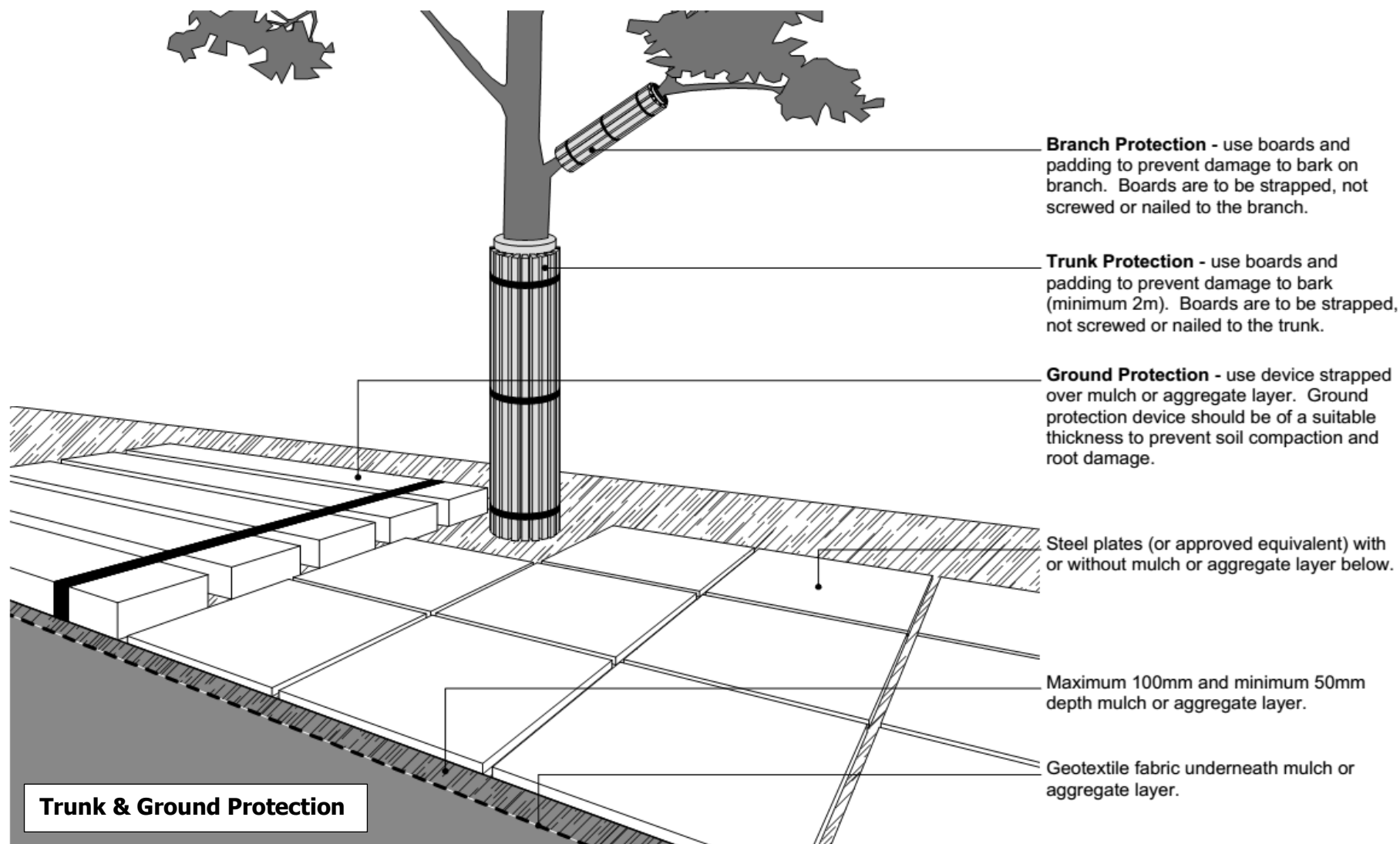
8: Trees T53-T55



9: Trees T57-T59

Appendix C – Establishment of TPZ Areas





Appendix D - Cascade Chart for Assessment of Tree Quality & Value

(Adapted from British Standard Institution (2005). Guide for Trees in Relation to Construction)

RETENTION CATEGORY & DEFINITION	CRITERIA - SUBCATEGORIES			IDENTIFICATION IF SHOWN ON A PLAN
	1. Mainly arboricultural values	2. Mainly landscape values	3. Mainly cultural values, including conservation	
Category A High Quality & Value: Those in such a condition as to be able to make a substantial contribution for a minimum of 40 years. Highly significant trees or trees listed on a significant tree register regardless of life expectancy (excluding hazardous trees). Priority for retention.	Trees that are particularly good examples of their species, especially if rare or unusual or essential components of groups or of formal or semi-formal Arboricultural features (e.g. The dominant and / or principal trees within an avenue). Trees that provide a definite contribution to the amenity of the locality.	Trees, groups or woodlands which provide a definite screening or softening effect to the locality in relation to views into or out of the site, or those of particular visual importance (e.g. Avenues or other Arboricultural features assessed as groups).	Trees, groups, remnant bushland or forest of significant conservation, historical, Aboriginal, commemorative or other value. Note: independent ecological/aboriginal/heritage assessment may be required.	GREEN
Category B Moderate Quality & Value: Those in such a condition as to make a significant contribution for a minimum of 15 years. Consider for retention.	Trees that might be included in the high category, but are downgraded because of impaired condition (e.g. presence of remediable defects including unsympathetic past management and minor storm damage).	Trees situated mainly internally to the site, therefore individually having little visual impact on the wider locality or, trees present in numbers, usually as groups or woodlands, such that they from distinct landscape features, thereby attracting higher collective rating than they might as individuals but which are not, individually essential components of formal or semi formal Arboricultural features (e.g. trees or moderate quality within an avenue that includes better A category specimens).	Trees with clearly identifiable conservation or other cultural benefits.	BLUE
Category C Low Quality & Value: Those in such a condition as to make a contribution for a minimum of 5 years. Consider for removal.	Trees not qualifying in higher categories. Juvenile, semi mature or small tree species which are considered easily replaceable.	Trees present in groups or woodlands, but without this conferring on them significantly greater landscape value, and / or trees offering low or only temporary screening benefit.	Trees with very limited conservation or other cultural benefits.	ORANGE
Category D Not suitable for retention: Those in such a condition that any existing value would be lost within 5 years, and which should in current context, be removed for reasons of sound Arboricultural management. Priority for removal.	Trees that have a serious, irremediable structural defect, such that their early loss is expected due to failure, including those that will become unviable after removal of other trees (i.e. where, for whatever reason the loss of companion shelter cannot be mitigated by pruning). Trees that are dead or are showing signs of significant, immediate and irreversible overall decline. Trees infected with a pathogen of significance to the health and/or safety of other trees nearby, or very low-quality trees suppressing adjacent trees of better quality. Trees causing significant damage to structures, where no viable alternatives exist for remedial tree management / modification of structures to enable tree retention. Trees considered a weed species or those listed as noxious weeds. NOTE: Dead or dying trees with hollows or cavities may be of ecological importance. These trees are to be identified and assessed independently of the criteria in this cascade chart. Where category D trees are removed habitat reinstatement may be appropriate.			RED