Arboricultural Impact Assessment and Tree Management Plan

Site: 24 Railway Street, Hurlstone Park

Date: 15/03/2021 Reference: 01021

Green Spaces Consultancy

Lisa Durland
Consulting Arborist AQF 5

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2 Introduction

Green Spaces Consultancy has been engaged by Ms. Wai Fong Soo *(the owner)* to undertake an Arboricultural Impact Assessment report in relation to the trees at 24 Railway Street, Hurlstone Park (*the site*).

The report is for submission in conjunction with a Development Application to Canterbury Bankstown Council.

The proposed development is for demolition of the existing dwelling, garage and shed and the construction of a new two storey dwelling.

As the site is located within the Railway Street Heritage Conservation area, in accordance with Part B3.3 (f) of the Canterbury DCP tree management controls, all trees regardless of size, require Council consent for removal.

Six (6) exempt trees, seventeen (17) low value trees and three (3) moderate value trees are proposed for removal.

Two (2) exempt trees, two (2) low value trees and one moderate value tree are proposed for retention.

There are works proposed within the theoretical Tree Protection Zones of six (6) trees located on adjacent sites. Recommendations have been made to mitigate any significant impact to these trees.

The site was attended by Lisa Durland *(the author)* on Monday 8th March 2021.

3 Aims

- Provide an assessment of the current health, vigour and structural condition of the trees.
- Provide a retention value for each tree.
- Provide advice relating to the suitability of the retention or removal of the trees on the site in the context of the proposed development.
- To identify existing trees to be retained and removed.
- Identify the Structural Root Zone and Tree Protection Zone (SRZ and TPZ in accordance with *AS4970 'Protection of trees on development sites'*) for trees to be retained.
- Identify the impact of the proposed development on the site trees.
- Identify any additional issues that may require assessment or ongoing monitoring.
- Provide recommendations for the management of the trees during development and mitigating the impacts to trees that are to be retained.

4 Documentation

The Architect has provided the following -

Plan/Document	Prepared by	Dwg No/Ref No	Dated
Architectural Plans	Mcdonald Jones Homes Site Plan	Sheet 2/22, Dwg.606165	26/01/21
Survey Plan	Aspect Development & Survey	Ref: 606165	05/01/21

Figure 1 – Table of supplied plans and documents

The plans/documents provided (as listed above) have been relied upon for the information provided in this report.

The tree locations referenced in this document correspond to the information as supplied on the survey plan provided and the tree numbering is consistent with the numbering used on the tree location plan in Section 6.

Detailed Stormwater/drainage Plans and Landscape Plans have not been provided for assessment.

5 The Site

The site is identified as Lot 10, Section 5, in DP3849 and is located at the address known as 24 Railway Street, Hurlstone Park. The lot is rectangular in shape and rises from the front of the site (RL in north corner 20.25) to the rear (RL in northern corner 23.00).
The location of the site is shown with a red flag in Image 1 below.

Image 1 - Site Location (Source: https://maps.six.nsw.gov.au/)

5.1 Land Titles and Planning Controls

The following site details are recorded from the NSW Planning Portal website and the Canterbury Bankstown Council website:

- Lot/Section/Plan No. – 10/5/DP3849
- Land use Zones - R2 – Low Density Residential
- Local Environmental Plan – Canterbury LEP 2012
- Development Control Plan – Canterbury DCP 2012 (amended 2017)
- Tree Management – Part B3 of the Canterbury DCP
- Heritage – The site is in the Railway Street Heritage Conservation Area.

6 Tree Locations

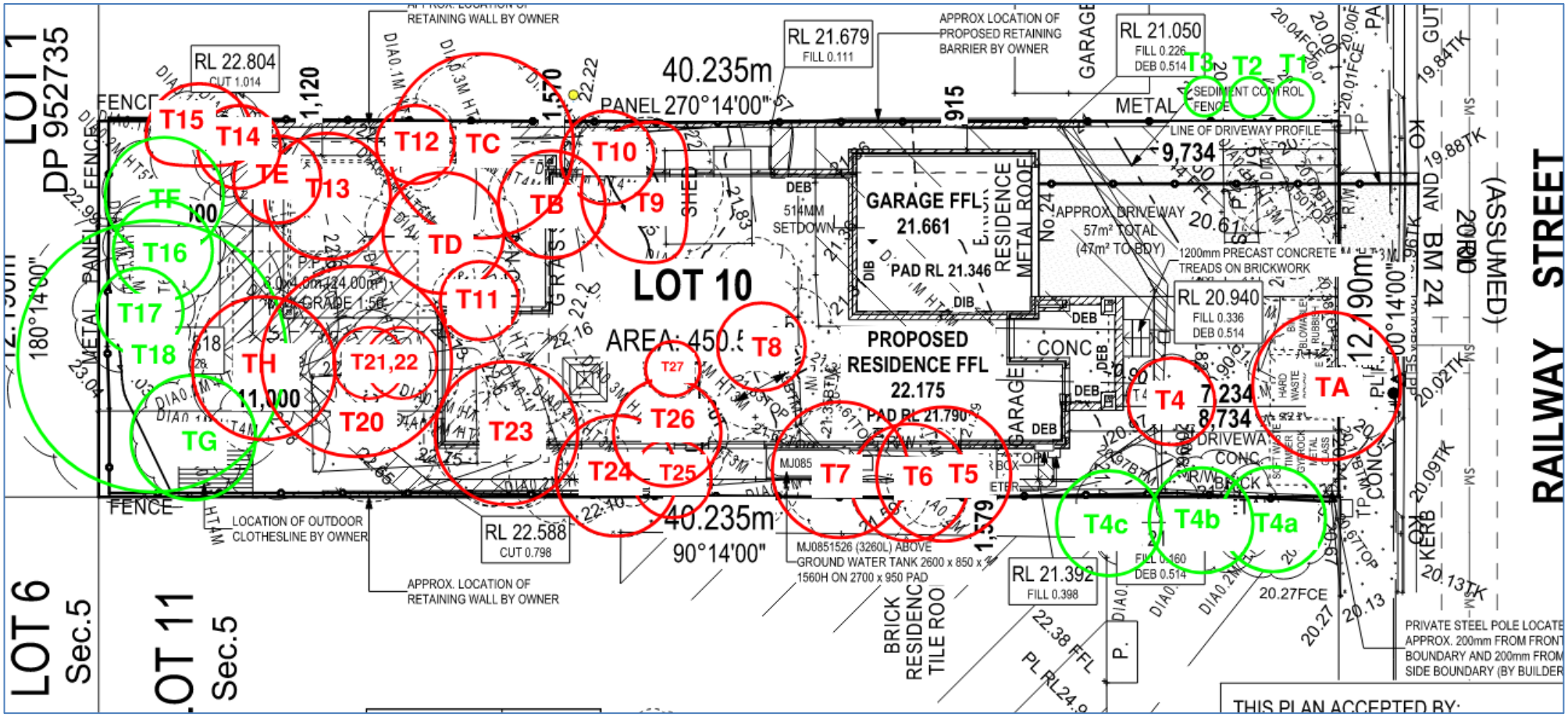

Figure 2 – Tree locations/numbers from survey plan/site inspection. Trees numbered in red text to be removed, trees in green text to be retained and protected. Trees annotated with letters are species exempt from the tree management controls.

7 SRZ / TPZ Table – Trees to be retained

Tree #	Botanical Name (Common Name)	SRZ radius (m)	TPZ (m)
1	*Juniperus virginiana* 'Spartan' (Spartan Juniper)	1.0*	1.5
2	*Juniperus virginiana* 'Spartan' (Spartan Juniper)	1.0*	1.5
3	*Juniperus virginiana* 'Spartan' (Spartan Juniper)	1.0*	1.5
4a	*Magnolia x soulangiana* (Saucer Magnolia)	1.5**	2.0**
4b	*Hibiscus sinensis* (Hibiscus)	1.5**	2.0**
4c	*Camellia japonica* (Japonica Camellia)	1.5**	2.0**
TF	*Citrus sinensis* (Orange Tree)	1.5	2.0
T16	*Archonotphoenix cunninghamiana* (Bangalow Palm)	-	1.5***
T17	*Camellia japonica* (Japonica Camellia)	1.5	2.0
T18	*Banksia serrata* (Old Man Banksia)	2.1	3.3
TG	*Citrus reticulata* (Mandarin)	1.5	2.0

*This setback has been adjusted in consideration of the species and size of the trees as being the minimum required to assure structural stability and ongoing health - one side only.

** No access to measure – estimated from visual of parts that could be seen.

****AS4970 'Protection of trees on development sites'* nominates that the TPZ for palms should not be less than 1 metre outside the crown projection however for this project it is considered that a TPZ of 1.5 metres is sufficient. This distance is based on the authors experience relating to excavation near similar palms on other similar projects.

DBH – **D**iameter at **b**reast **h**eight (AS4970 nominates DBH at 1.4m above ground).

DARF – **D**iameter of the trunk just **a**bove the **r**oot **f**lare.

8 Development Impact Discussion

The following trees/vegetation are nominated for removal –

Tree A – *Celtis sinensis* (Hackberry) – Exempt

Tree B – Citrus sinensis (Orange Tree) – Exempt

Tree C – *Persea americana* (Avocado) – Exempt

Tree D – *Mangifera indica* (Mango) – Exempt

Tree E – *Ochna serrulata* (Mickey Mouse Plant) – Exempt

Tree H – *Persea americana* (Avocado) – Exempt

Tree 4 – *Camellia Japonica* (Japonica Camellia) – Low retention value

Tree 5 – *Lagerstroemia indica* (Crepe Myrtle) – Low retention value

Tree 6 – *Camellia Japonica* (Japonica Camellia) – Low retention value

Tree 7 – *Camellia Japonica* (Japonica Camellia) – Low retention value

Tree 8 – *Camellia Japonica* (Japonica Camellia) – Low retention value

Tree 9 – *Callistemon viminalis* (Weeping Bottlebrush) – Low retention value

Tree 10 – *Tibouchina urvilleana* (Tibouchina) – Low retention value

Tree 11 – *Hibiscus sinensis* (Hibiscus) – Low retention value

Tree 12 – *Camellia Japonica* (Japonica Camellia) – Low retention value

Tree 13 – *Corymbia ficifolia* (Flowering Gum) – Low retention value

Tree 14 – *Camellia Japonica* (Japonica Camellia) – Low retention value

Tree 15 – *Lagerstroemia indica* (Crepe Myrtle) – Low retention value

Tree 20 – *Leptospermum petersonii* (Lemon Scented Tea Tree) – Low retention value

Tree 21 – *Howea forsteriana* (Kentia Palm) – Moderate retention value

Tree 22 – *Howea forsteriana* (Kentia Palm) – Moderate retention value

Tree 23 – *Tibouchina urvilleana* (Tibouchina) – Low retention value

Tree 24 – *Rothmannia globosa* (Tree Gardenia) – Low retention value

Tree 25 – *Howea forsteriana* (Kentia Palm) – Moderate retention value

Tree 26 – Pyrus species (Ornamental Pear) – Low retention Value

Tree 27 – *Rothmannia globosa* (Tree Gardenia) – Low retention value

In summary there six (6) exempt trees, seventeen (17) low value trees and three (3) moderate value trees proposed for removal. These trees are located within the building or excavation footprint and therefore will need to be removed if the proposal is supported.

<u>The following site trees are nominated for retention</u> –

Tree F – Citrus sinensis (Orange Tree) – Exempt

Tree G – *Citrus reticulata* (Mandarin) – Exempt

Tree 16 – *Archonotphoenix cunninghamiana* (Bangalow Palm) – Low retention value

Tree 17 – *Camellia japonica* (Japonica Camellia) – Low retention value

Tree 18 – *Banksia serrata* (Old Man Banksia) – Moderate retention value

In summary there are two (2) exempt trees, two (2) low value trees and one moderate value tree proposed for retention.

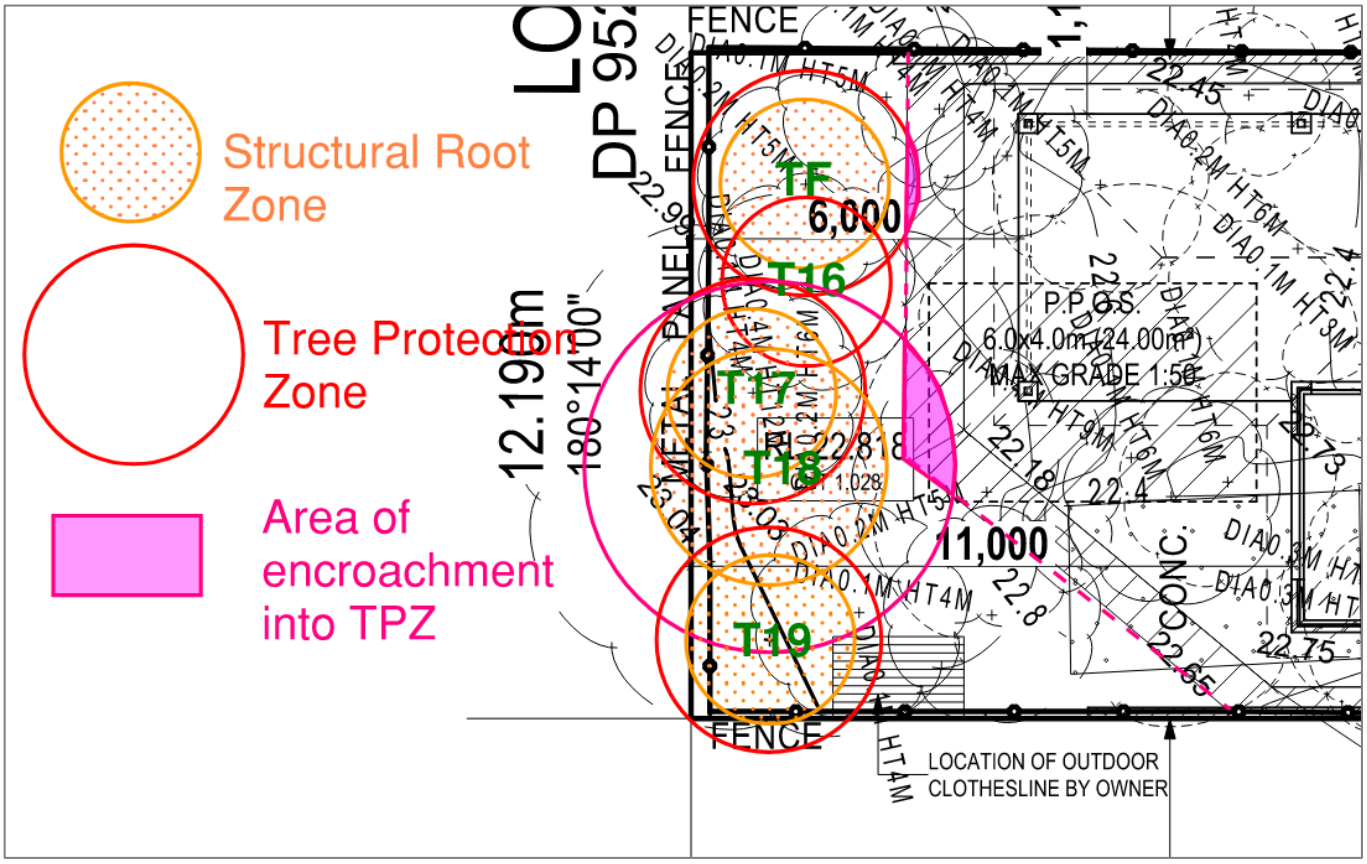

Figure 3 – Showing the SRZ and TPZ and TPZ encroachments to site trees to be retained. The pink dashed line shows the top of the excavation embankment.

The proposed area of excavation does not encroach into the Structural Root Zone of any tree to be retained. There is no 'major' (>10%) encroachment into the Tree Protection Zone of any site tree to be retained.

Provided the tree protection is installed as recommended in Part 9 there will be little, if any, impact on these trees from the proposed development.

Trees on adjacent sites –

Trees 1, 2 and 3 (*Juniperus virginiana* 'Spartan' - Spartan Juniper) located near the common side boundary on the adjacent site at 26 Railway Street may be impacted by the excavation for the side access path between the proposed driveway and side boundary. In consideration of the size, maturity and species it is recommended that a minimum setback to any excavation be one (1) metre from these trees. The nominated setback includes excavation for services including stormwater lines and pits as well as for any retaining structures.

Roots from Trees 4a, 4b and 4c (*Magnolia x soulangiana* - Saucer Magnolia, *Hibiscus sinensis* – Hibiscus, *Camellia japonica* - Japonica Camellia) located near the common side boundary at 22 Railway Street are not likely to be occupying the subject site. It is highly likely that the footing of the existing low retaining wall along the boundary and the existing concrete driveway slab on the subject site have constrained root occupation. The driveway will be removed and therefore the growing conditions for this vegetation will be improved if there are roots on the subject site. See recommendations in Part 9.

Provided the boundary fences remain intact and the recommendations in Part 9 are undertaken, there will be little, if any, impact to the vegetation on adjacent sites.

9 Recommendations and tree protection specifications

It is recommended that -

- Trees F, G, 1, 2, 3, 4a, 4b, 4c, 16, 17 and 18 be retained and protected during demolition and construction. Excavation and retaining structures shall be setback a minimum of one (1) meter from Trees 1, 2 and 3. As a precautionary measure demolition of existing slabs within the TPZ of Trees 4a, 4b and 4c shall be undertaken in accordance with 9.1.4.
- If approved by Canterbury Bankstown Council Trees Tree A, B, C, D, E, H, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 20, 21, 22, 23, 24, 25, 26, 27 be removed.
- Tree Protection be installed in accordance with the Tree Protection Plan in Appendix 2 and the specifications in Section 9.1, 9.1.2 and 9.1.3. Tree protection must be installed prior to any work, including demolition, commencing and shall remain in place until all work is completed.
- All works are carried out as specified in Sections 9.1.4 – 9.1.8

9.1 Tree Protection Zones

As defined in *AS 4970-2009 'Protection of trees on development sites'* (AS4970) the Tree Protection Zone (TPZ) is the principal means of protecting trees on development sites. The TPZ is a combination of root area and crown area requiring protection.

9.1.1 Prohibited Activities

As listed in AS4970, the following activities must be excluded from the TPZ's whether the area is fenced or not:

- machine excavation – unless approved by the Project Arborist
- excavation for silt fencing
- cultivation
- storage
- preparation of chemicals (including cement products)
- parking of vehicles and plant
- refueling
- dumping of waste
- wash down and cleaning of equipment
- placement of fill – unless minor change using friable fill
- lighting of fires

- soil level changes
- temporary or permanent installation of utilities and signs, and
- physical damage to the tree

Within the TPZ of any tree the works shall be undertaken as follows -

9.1.2 Fencing

The tree protection fencing shall be erected prior to any works (other than tree removal and pruning) commencing on the site. The fencing shall be installed in the location as shown by the blue lines on the Tree Protection Plan in Appendix 2. The fencing shall be constructed from 1.8-metre-high galvanised steel framed (50mm) panels with chain link infills. The panels shall be clamped together to prevent sideways movement and shall be stabilized at the ground with concrete block 'feet'. Refer to Image 2 below as an example.

The fencing shall remain in situ until the completion of all construction unless amended locations are required at various stages of the works. Any change in approved fencing locations must be approved prior, and in writing, by the Project Arborist.

Image 2 - Example of recommended fencing materials and configuration

All tree protection fencing shall be prominently sign posted indicating that the area is not to be accessed. The sign shall include contact details for the builder/project manager and project arborist and can also include information about activities that are not allowed within the Tree Protection Area.

At a minimum the signs shall –

- Be visible from within the development site and shall be compliant with AS 1319-1994 'Safety signs for the occupational environment' – as specified in AS4970.
- Be annotated as conditioned by Council (if applicable).
- Be constructed from a durable material (i.e. metal, Coreflute) that will last for the duration of the works on site.
- Be securely attached to the fencing and replaced if removed or if the attachment fails.

- Be left in place until the Tree Protection Fencing (or other tree protection) is approved for removal by the Project Arborist.
- Include contact details for the Project Arborist

9.1.3 Ground protection

Where it is not practical to fence the TPZ area, ground protection has been specified where considered it is required, relating to the nature of the proposed works. In accordance with *AS4970 "Protection of trees on development sites'* ground protection may include 100mm of mulch laid over a geotextile membrane, or if machinery is required within the TPZ, aggregate or rumble boards laid over geotextile. Refer to the Tree Protection Plan in Appendix 2.

9.1.4 Demolition/pavement removal

The existing pavements to be demolished shall be carefully lifted to minimize damage to the underlying soil profile (or sub-base materials) and to minimize disturbance to tree roots if they are encountered. Work outwards from the end closest to the tree/s and wherever possible retain existing sub-base materials. Methodology to be approved by Project Arborist.

9.1.5 Excavation

Should woody roots need to severed along the line of excavation at the rear of the site, these roots must be cleanly cut (not torn with machinery) using a 'fit for purpose' and sharp pruning saw.

Any spoil from the excavations must not be left within the TPZ unless approved in writing by the Project Arborist.

9.1.6 Exposed Roots

Exposed roots to be retained (to be determined by Project Arborist and/or as conditioned by Council) shall be protected from direct sunlight, drying out and extremes of temperature by covering with a geotextile fabric or similar that is to be kept damp at all times.

9.1.7 Planting / Soft Landscaping

Within the nominated TPZs any excavation for planting must be carefully undertaken by handheld tools ensuring that woody tree roots are not damaged - plants to be located accordingly.

9.1.8 Service installation

All proposed stormwater lines and subterranean services shall be located outside the TPZ of trees to be retained unless approved in writing by the Project Arborist prior to installation. Where installation outside the TPZ is not possible an alternate measure to excavation may be utilized. Measures such as suspending pipes under slabs, decking and other structures are likely to be appropriate. Small incursions into the TPZ (but clear of the SRZ) may be approved by the Project Arborist with conditions relating to excavation methodologies / installation methodologies to mitigate the impact to tree roots.

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TRAQ – ISA Tree Risk Assessment Qualification
QTRA – Quantified Tree Risk Assessment
Assoc Diploma Landscape Design
Certificate of Horticulture

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11 Appendix 1 – Tree/Vegetation Assessment Data

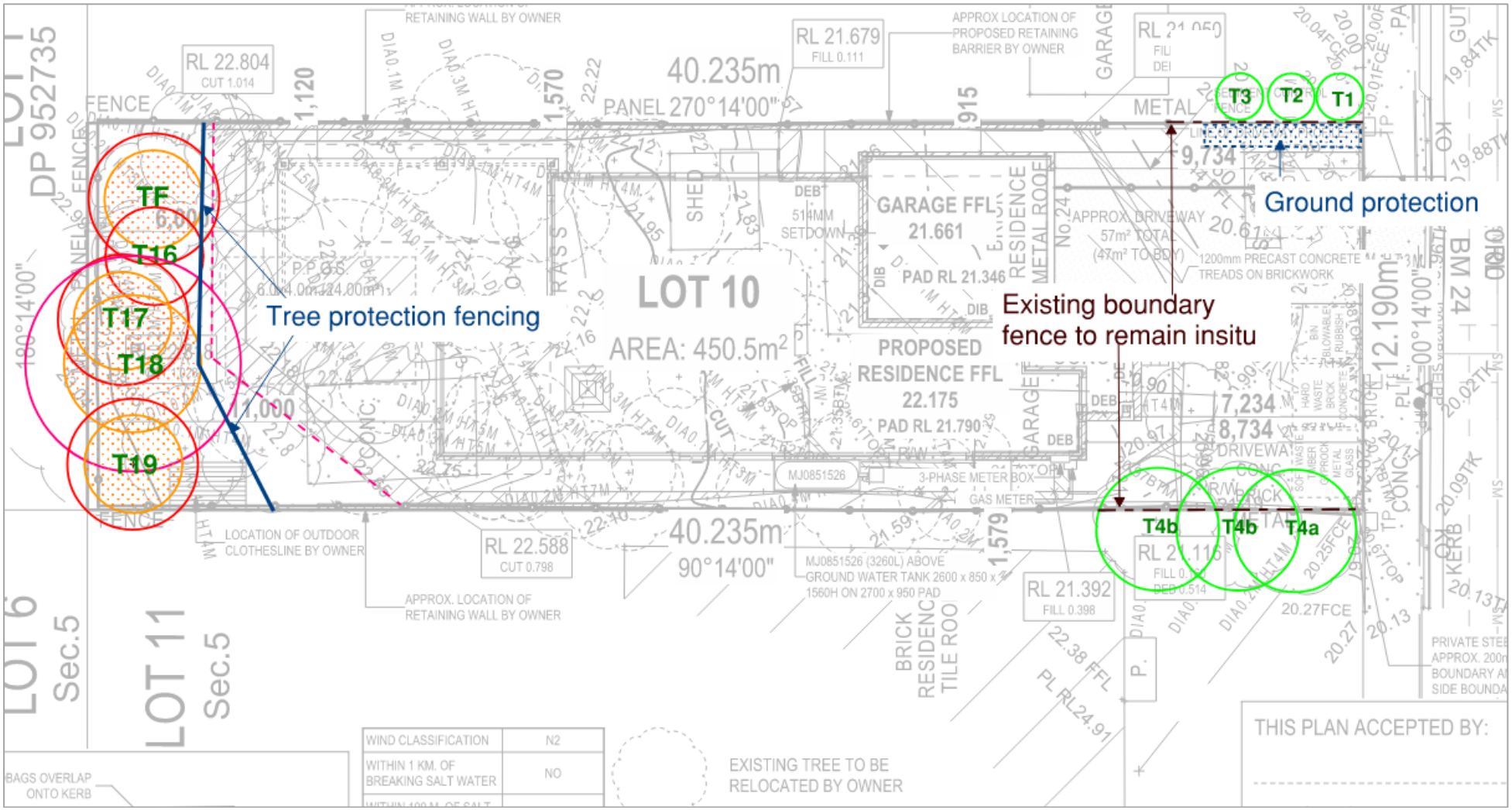
Tree #	Botanical Name (Common Name)	Estimated Height (m)	Estimated av. crown spread (m)	DBH (mm)	TPZ radius (m)	DARF (mm)	SRZ radius (m)	Health	Condition	Retention Value	Comments
1	*Juniperus virginiana* 'Spartan'	4	1.2	130	2	135	1.5*	G	G	-	On adjacent site so viable retention is a priority.
2	*Juniperus virginiana* 'Spartan'	4	1.2	130	2	135	1.5*	G	G	-	On adjacent site so viable retention is a priority.
3	*Juniperus virginiana* 'Spartan'	4	1.2	130	2	135	1.5*	G	G	-	On adjacent site so viable retention is a priority.
4	*Camellia japonica* (Japonica Camellia)	4	3	140	2	160	1.5	G	M	Low	Asymmetrical canopy due to proximity to garage. Co-dominant from 600mm.
4a	*Magnolia x soulangiana* (Saucer Magnolia)	3	2	-	2**	-	1.5**	G	-	-	On adjacent site so viable retention is a priority. Limited access for VTA.
4b	*Hibiscus sinensis* (Hibiscus)	3	2	-	2**	-	1.5**	G	-	-	On adjacent site so viable retention is a priority. Limited access for VTA
4c	*Camellia japonica* (Japonica Camellia)	3	2	-	2**	-	1.5**	G	-	-	On adjacent site so viable retention is a priority. Limited access for VTA.
5	*Lagerstroemia indica* (Crepe Myrtle)	5	3	160	2	165	1.5	G	G	Low	
6	*Camellia japonica* (Japonica Camellia)	3.5	2	250	3	275	1.9	G	M	Low	
7	*Camellia japonica* (Japonica Camellia)	3.5	2	310	3.7	320	2	M	P	V Low	Topped. Dead limbs. Codominant from 1 metre.
8	*Camellia japonica* (Japonica Camellia)	3.5	2.5	240	2.8	260	1.8	G	M	Low	
9	*Callistemon viminalis* (Weeping Bottlebrush)	3.5	3	135	2	150	1.5	M	M	Low	Supressed by T10.
10	*Tibouchina urvilleana* (Tibouchina)	3	3	200	2.4	270	1.9	M	P	Low	Poor past pruning. Decay in some stems.
11	*Hibiscus sinensis* (Hibiscus)	2.2	1.5	260	3.1	280	1.9	M	M	V Low	
12	*Camellia japonica* (Japonica Camellia	2	2	70	2	100	1.5	G	M	V Low	Multi-stemmed from 300mm.
13	*Corymbia ficifolia* (WA Flowering Gum)	4.5	3.5	125	2	145	1.5	M	P	Low	Sparse canopy.
14	*Camellia japonica* (Japonica Camellia	2	1	-	-	-	-	G	G	V Low	
15	*Lagerstroemia indica* (Crepe Myrtle)	4	3	130	2	145	1.5	G	G	Low	
16	*Archontophoenix cunninghamiana (Bangalow Palm)*	6	3	-	1.5*	-	-	G	G	Low	
17	*Camellia japonica* (Japonica Camellia)	3	2	80	2	100	1.5	G	G	Low	
18	*Banksia serrata* (Old Man Banksia*)*	8	5	275	3.3	350	2.1	G	G	Moderate	

Tree #	Botanical Name (Common Name)	Estimated Height (m)	Estimated av. crown spread (m)	DBH (mm)	TPZ radius (m)	DARF (mm)	SRZ radius (m)	Health	Condition	Retention Value	Comments
20	*Leptospermum petersonii* (Lemon Scented Tea Tree)	8	6	320	3.8	.350	2.1	G	M	Low	Co-dominant from 400mm.
21	*Howea forsteriana* (Kentia Palm)	8.5	2.5	-	1.5*	-	-	G	G	Moderate	
22	*Howea forsteriana* (Kentia Palm)	8.5	2.5	-	1.5*	-	-	G	G	Moderate	
23	*Tibouchina urvilleana* (Tinouchina)	4	4	-	-	-	-	M	P	Low	Poor past pruning. Dead and decayed stubs.
24	*Rothmannia globosa* (Tree Gardenia)	4	1.5	110	2	120	1.5	G	G	Low	
25	*Howea forsteriana* (Kentia Palm)	8.5	2.5	-	1.5*	-	-	G	G	Moderate	
26	*Pyrus species* (Ornamental *Pear)*	3	2.5	-	-	-	-	G	M	Low	
27	*Rothmannia globosa* (Tree Gardenia)	4	1	-	-	-	-	G	G	Low	
A	*Citrus sinensis* (Orange Tree)	-	-	-	-	-	-	-	-	-	Exempt species (DCP Part B3.4)
B	*Citrus sinensis* (Orange Tree)	-	-	-	-	-	-	-	-	-	Exempt species (DCP Part B3.4)
C	*Persea americana* (Avocado)	-	-	-	-	-	-	-	-	-	Exempt species (DCP Part B3.4)
D	*Mangifera indica* (Mango)	-	-	-	-	-	-	-	-	-	Exempt species (DCP Part B3.4)
E	*Ochna serrulata* (Mickey Mouse Plant)	-	-	-	-	-	-	-	-	-	Exempt species (DCP Part B3.4)
F	*Citrus sinensis* (Orange Tree)	-	-	-	-	-	-	-	-	-	Exempt species (DCP Part B3.4)
G	*Citrus reticulata* (Mandarin)	-	-	-	-	-	-	-	-	-	Exempt species (DCP Part B3.4)

* *AS4970 'Protection of trees on development sites'* nominates that the TPZ for palms should not be less than 1 metre outside the crown projection however for this project it is considered that a TPZ of 1.5 metres is sufficient. This distance is based on the authors experience relating to excavation near similar palms on other similar projects.

** Limited access for assessment.

12 Appendix 2 – Tree Protection Plan



13 Appendix 3 – Images

Image 3

Image 4

Image 5

Image 6

Image 7

Image 8

Image 9

Image 10

14 Appendix 4 - Tree Assessment Methodologies

The assessment of the trees is based on a visual inspection of the trees from ground level using relevant aspects of the Visual Tree Assessment (VTA) method as outlined by Mattheck & Breloer (1994). The inspection included notation of the approximate dimensions of the tree, the density and health of the foliage in conjunction with an examination of the form and structure of the trunks, branches and crown and an assessment of the health and soundness of these elements of the trees.

The inspection was limited to visual inspection of each tree without dissection or coring. The inspection did not include aerial inspection and no testing of woody tissue or substantial subterranean root investigation was undertaken.

All measurements from the trees are taken as if measured from the centre of the tree trunk and are expressed in meters.

The criteria for assessing health included assessing density of the canopy, new extension growth, impact of pests and or diseases, amount and dimensions of deadwood/dieback, size and colour of foliage and presence or absence of epicormic growth. Each tree was rated as having Good (G), Medium (M), Poor (P) or Dead (D) health.

The criteria for assessing condition included assessing the soundness of the branch unions, presence of cavities and or decay, branching structure including co-dominant trunks and rubbing branches, leaning trunks, root girdling or root damage/removal, branch failures and general structural integrity. Each tree was rated as having Good (G), Medium (M), Poor (P) or Remove (R) condition.

No soil sampling or testing has been undertaken.

The Structural Root Zones (SRZ) and Tree Protection Zones (TPZ) have been calculated using the formula as nominated in AS 4970 ‘Protection of trees on development sites. The assessment of encroachment from previous development uses AS 4970 ‘Protection of trees on development sites’ – Section 3.3.2 and 3.3.3 as a point of reference.

The results of the visual tree assessments for the site trees have been summarized in a table in Appendix 1.

15 Appendix 5 - Tree Retention Value Assessment Methodology

The process as detailed below was used to determine a retention value for each tree on the site. The retention value assists in determining the constraint value of each tree in the context of designing the proposed development.
A retention value for each tree has been determined and is included in Appendix 1.

The process for determining the retention values involved a considered methodology detailed as follows, in order of undertaking -

15.1 ULE

Each tree has been assigned a ULE (Useful Life Expectancy) value modified by a process developed by Barrell (1996). The objective of a ULE assessment is to assign a relative value to individual trees within a group for the purpose of informing future management options. In summary, ULE is the life expectancy of each tree modified by economic considerations, impacts on trees with a longer ULE and the retention of the amenity of the wider landscape. ULE values for the trees are included in the table in Appendix 1 and details of the ULE categories (from which the ULE values were derived) are provided in Appendix 7.

15.2 Landscape Significance rating

Each tree has been assigned a Landscape Significance rating using the criteria developed by Morton (2011). The trees have been rated using criteria relating to heritage, ecological and amenity values. Landscape Significance ratings for each tree are included in Appendix 1 and the table detailing the criteria for assigning significance ratings is provided in Appendix 8.

15.3 Retention Value

As required by Clause 2.3.2 of AS4970 '*Protection of trees on development sites'* a Retention Value has been assigned to each tree on the site.
Using the ULE and the Landscape Significance rating the Tree Retention Value Matrix has been applied to determine a retention value for each tree. The matrix is included in Appendix 9.

The Retention Value does not include a consideration of the proposed development work and is not a schedule for tree retention or tree removal however is one, of several, considerations when designing works on a development site.

16 Appendix 6 - Development Impact Assessment Methodology

The following methodology was used to determine the impacts of the proposed development on trees to be retained. Additionally, site conditions that are likely to have constrained root growth and or reduction of impact due to structures that are to be retained have also been considered.

As defined in *AS 4970-2009 'Protection of trees on development sites'* (AS4970) the Tree Protection Zone (TPZ) is the principal means of protecting trees on development sites. The TPZ is a combination of root area and crown area requiring protection. It is ideally an area isolated from construction disturbance (i.e., excavation or fill, trenching, ripping, grading, compaction etc.) so that the tree remains viable.

The TPZ is a radial distance measured from the centre of the tree trunk.

The TPZ and Structural Root Zones (SRZ) dimensions for the trees where recorded are in the table in Appendix 1.

16.1 Determining Tree Protection Zones

As defined in AS 4970 Section 1.4.7 the TPZ is 'a specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree's roots and crown (canopy) to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development'. The TPZ is the root zone/canopy area required for vigour and long-term viability. The TPZ area has been calculated as specified in Section 3.2 of AS 4970.

16.2 Determining Structural Root Zones

As defined in AS 4970 Section 1.4.5 the SRZ is 'the area around the base of a tree required for the tree's stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright.' The SRZ area has been calculated as specified in Section 3.3.5 of AS 4970.

16.3 Variation to the TPZ – Major

Should major encroachments (> 10%) of the TPZ be proposed it must be demonstrated by The Project Arborist that the tree will remain viable into the long term. Demonstration of viability may include non-destructive methods of root investigation and should be made in consideration of the following factors as listed in Section 3.3.4 of AS 4970:

- Location and distribution of the roots
- Potential loss of root mass
- Tree species and tolerance to root disturbance
- Age, vigour and size of the tree
- Lean and stability of the tree
- Soil characteristics
- Existence of past or existing structures affecting root growth
- Design factors

16.4 General Comment - Encroachments into the TPZ

Calculating the percentage of the encroachment is the initial step in the process of assessing any impact. The nature of any major encroachment (>10%) must also be considered in the context of Section 3.3.4 of AS 4970.

17 Appendix 7 - Useful Life Expectancy (ULE) Categories

Each tree has been allocated a ULE rating that aligns with one of the categories below –

I. 40 years or more
II. 15 - 40 years
III. 5 -15 years
IV. Less than 5 years

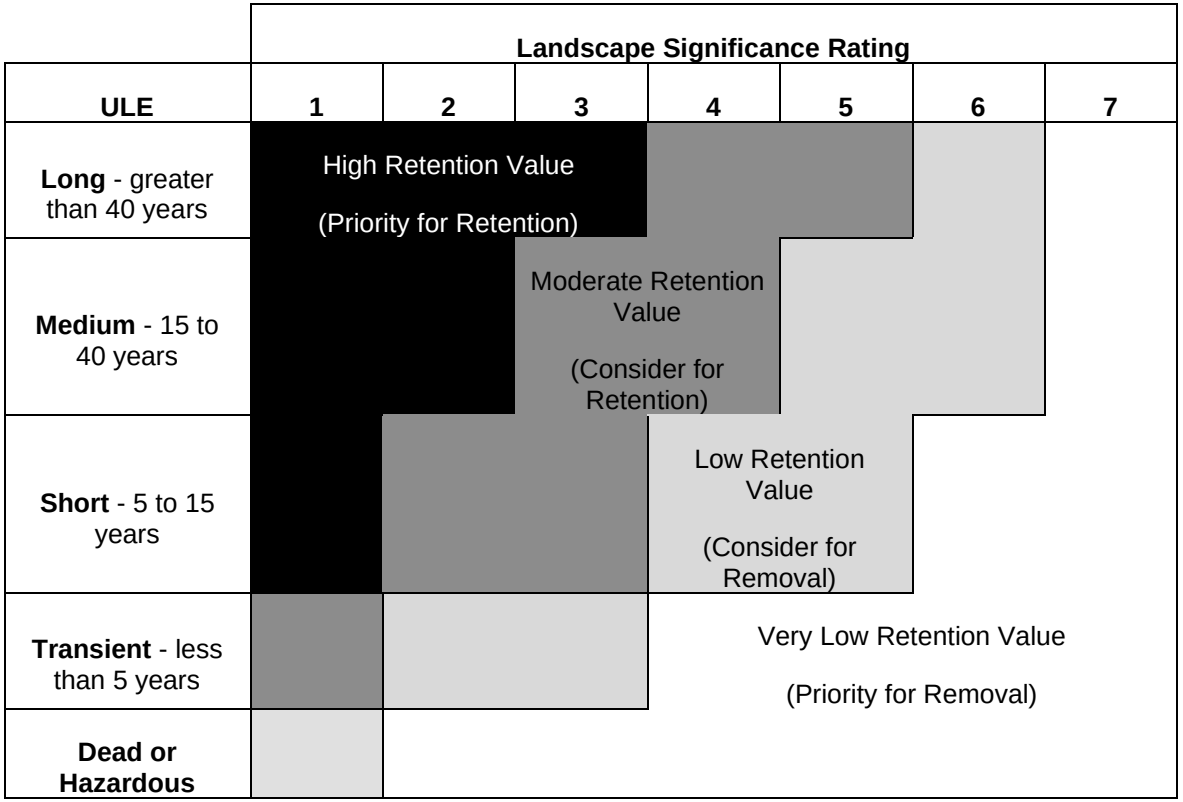
The methodology has been modified from Barrell (1996) and is based on an estimate of the longevity of each tree in consideration of the growing environment. Further consideration is given to the tree health, structural condition and the site suitability and the ULE is modified if required.

18 Appendix 8 – Landscape Significance Table

Ref: Andrew Morton - Earthscape Horticultural, Berowra, NSW (December 2011) – modified by Green Spaces Consultancy 2019.

RATING	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
1. SIGNIFICANT	The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance or is listed on Council's Significant Tree Register	The subject tree is scheduled as a Threatened Species as defined under the Threatened Species Conservation Act 1995 (NSW) or the Environmental Protection and Biodiversity Conservation Act 1999	The subject tree has a very large live crown size exceeding 300m² with normal to dense foliage cover, is in a visually prominent position in the landscape, exhibits very good form and habit typical of the species
	The subject tree forms part of the curtilage of a Heritage Item (building /structure /artefact as defined under the LEP) and has a known or documented association with that item	The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species	The subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity
	The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event	The subject tree is a Remnant Tree, being a tree in existence prior to development of the area	The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.
2. VERY HIGH	The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc.) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site.	The tree is a locally indigenous species, representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site.	The subject tree has a very large live crown size exceeding 200m²; a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area
3. HIGH	The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence	The tree is a locally indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link / Wildlife Corridor or has known wildlife habitat value	The subject tree has a large live crown size exceeding 100m²; The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g., crown distortion/suppression) with a crown density of at least 70% (normal); The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area
4. MODERATE	The tree has no known or suspected historical association but does not detract or diminish the value of the item and is sympathetic to the original era of planting.	The subject tree is a non-local native or exotic species that is protected under the provisions of this DCP.	The subject tree has a medium live crown size exceeding 40m²; The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc.) with a crown density of more than 50% (thinning to normal); and
			The tree is visible from surrounding properties but is not visually prominent – view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area.
5. LOW	The subject tree detracts from heritage values or diminishes the value of a heritage item	The subject tree is scheduled as exempt (not protected) under the provisions of this DCP due to its species, nuisance or position relative to buildings or other structures.	The subject tree has a small live crown size of less than 40m² and can be replaced within the short term (5-10 years) with new tree planting
6. VERY LOW	The subject tree is causing significant damage to a heritage Item.	The subject tree is listed as an Exempt Species in the relevant Local Government Area, being invasive, or is a known nuisance species.	The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% (sparse).
7. INSIGNIFICANT	The tree is completely dead and has no visible habitat value	The tree is an invasive weed under the Biosecurity Act (2015) within the relevant Local Government Area.	The tree is completely dead and represents a potential hazard.

19 Appendix 9 - Tree Retention Values Matrix



Ref: - Modified from
Couston, Mark & Howden, Melanie (2001)
Tree Retention Values Table
Footprint Green Pty Ltd, Sydney Australia