

**ARBORICULTURAL IMPACT ASSESSMENT FOR 2022 DEVELOPMENT AT
18-22 SPRING STREET WAGGA WAGGA NSW 2650**

1. INTRODUCTION.

There is a planned development by NSW Department of Planning, Industry and Environment, Land and Housing Corporation at three joining properties identified as 18, 20 and 22 Spring Street Wagga Wagga, NSW 2650.

A preliminary assessment of the tree vegetation was undertaken in October 2021 to identify trees on site, their condition, significance and recommendations for retention or removal within the planning process. Final design plan have been developed and an arboricultural impact assessment is now required for lodgement with the development application.

2. SCOPE AND PURPOSE.

The report has been commissioned by Mr. Adam Bower, Land and Housing Corporation Development Manager, Delivery South West Sydney and Southern NSW. He can be contacted on (02) 9374 3650.

The site was formally accessed on 21 September 2021.

The report is designed to provide;

- accurate identification of tree vegetation,
- tree condition, including any significant hazards present
- evaluation of the trees relative to their contribution to the environment, amenity and any other identified values
- evaluation of development impacts on the existing tree population
- interpretation of *WWCC Development Control Plan 2010 -PART B Section 5 Natural Resource and Landscape Management 5.2 preservation of trees.*
- recommendations for management of the issues identified.

Interpretation of impacts and recommendations are based on the author's interpretation of *Australian Standard 4970-2009 Protection of trees on development sites.*

Diagram One provides identification of the site/location.

The following Drawing was supplied.

*DUKE OF KENT HOUSING PROJECT - 18, 20 & 22 SPRING STREET, WAGGA WAGGA BLK: 37, 36, 35 DP: 21115. **OVERALL SITE PLAN.** SK 110. Issue P1. Dated 12/03/2022. CK Architecture Deakin ACT.*

This drawing contains existing trees on site, trees for retention and removal. Tree Protection Zones (TPZ) are also detailed. Some comments have been added and the drawing is provided at the conclusion of this report.

[Annexure 1 – Tree Data File](#) provides a detailed list of existing trees, their individual evaluation and development impact. Evaluation criteria is also provided. This annexure is also been included at the conclusion of the report.

3. Site Conditions and Background.

The site currently comprises 3 joining single story dwellings on the 3 cited residential address. Each address is approximately 520 square meters in area. The general proposal is to demolish the three existing dwellings and construct new buildings with greater occupancy capacity.



Diagram 1– Location of Assessment site – 3 lots -18 to 22 Spring Street.

Adapted from WWCC IntraMaps 2021.

The tree vegetation across the three sites is generally described as follows.

- There are a total of 14 trees and shrubs located across the site.
- There is one notable street tree located on the WWCC verge or nature strip outside each dwelling – which have good retention values.
- The remaining tree vegetation is described as a mixture of small exotic and native trees and shrubs with low environmental and amenity values – some weed species.

There is no remnant vegetation identified. The three WWCC street trees are identified as native vegetation.

4. Summary of Initial Tree Evaluation.

- 14 Trees were identified as potentially impacted by the development.
- Each tree was individually graded for its retention value within the development based upon a range of criteria as detailed within Annexure 1 – Tree Data File.
- The following Table A is a summary of all 14 trees retention values.
- None of the trees are identified as significant as individual trees, although the 3 WWCC trees are considered to have moderate significance as they form part of a greater line of mature native trees on the south verge of Spring Street.

- Theoretical canopy coverage excluding the WWCC street trees is only 248 square meters or 15% of the area. This percentage is considered very low and opportunity for increasing this coverage exists.

Table A – Summary of Tree Evaluation		
Evaluation Category	Descriptors	Tree No's
Retain Priority	• A Significant or Very Significant tree • Strong positive amenity and/or other values – normally long life expectancy. • Replacement very long term 60 - 100 years or more • Removal would be very difficult to justify	
Retain	• Tree with moderate significance • Positive Amenity values and/or other values with longer life expectancy • Replacement long term 40 - 80 years. • Removal would be difficult to justify.	1, 4 & 13
Retain if Possible	• Tree with some positive landscape, amenity or other values • In fair to good condition with some useful remaining life. • OR a younger semi mature tree in Excellent or good condition with long life expectancy or expected contribution. • However if the impost on the development of retention is very high or the development impact on the tree is high then removal or replacement can be considered a valid decision. • On balance of considerations the tree is worth retaining.	2
Remove	• The tree is normally in poor condition with short useful life expectancy, or • Structurally unsound to a point not worth effort of ameliorating. - OR • A small tree where the impost of retention is not justified. It would easily be replaced in 0-5 years. • At this point a new tree is normally considered a better long term option.	5,6,7,9, 10,11,12
Remove Priority	• An insignificant tree (shrub) - very small or • the tree is in very poor condition or a weed species or • structurally very poor or short useful life expectancy • a replacement tree/s is a far better option	3,8 & 14

5. Development impacts and Discussion. On Review of the final drawings for the development and assessment of the impacts to the trees, the following is a summary of the arboricultural impact for the development.

A. Trees to be removed.

- i. 10 of the 14 trees identified/evaluated as *remove priority* or *remove* are to be removed.
 1. The impact is considered negligible and the loss of vegetation cover can easily be replaced and improved with a sound landscaping plan.
- ii. Tree 2 was evaluated as *Retain if possible* – the building footprint is in direct conflict with the tree and it will have to be removed. Tree 2 is the only tree on development site that meets the criteria of tree preservation *WWCC Development Control Plan 2010 -PART B Section 5 Natural Resource and Landscape Management 5.2 preservation of trees.*

B. Trees to be retained.

- i. The three WWCC Street trees (Tree numbers 1, 4 and 13) are to be retained. Tree numbers 1 and 13 have general impacts to manage.
- ii. Tree 4 has direct impacts to manage as the proposed new driveway onto Spring Street will impact the tree protection zone on the west side of the tree to the point 2 m from the stem near the structural root zone. This encroachment is 27% of the TPZ and therefore a major encroachment. I am satisfied that the tree can be retained on the following basis.
 1. The tree canopy lends itself to canopy lifting on the west side to allow construction of the driveway and ongoing vehicle access and egress.
 2. The tree height is low for the stem diameter – and wind loading on the retained root systems is therefore in favour of the tree.
 3. The council verge area with grass/soil is quite a large area and the tree will no doubt have significant root systems within this area well outside the tree protection zone on the east side of the tree. Development impacts to the council verge on the east side should be negligible or nil – and root systems outside the TPZ on the east side can also be retained.
 4. The tree is in good condition and the species is well suited to the location, the general Wagga Wagga environment and the tree should cope with the root loss from the driveway construction.
 5. The tree can easily be retained as it is outside the general development area and the impost of working around the tree is very low.
 6. The tree is a mature tree in good condition with long life expectancy and forms a line of trees in the street well past the development area in both east and west directions.

C. Canopy loss.

- i. The existing canopy coverage of the three lots was only 15% - all of which will be removed. This percentage is considered quite poor and a

prudent landscape plan should easily improve this coverage with plantings that will provide mature coverage far greater than 15%.

6. Findings and General Recommendations.

A. Tree Retention or Removal Decisions.

Existing site trees that are of some age, have good structure and longer life expectancy should be considered for retention and protection unless there is a compelling reason to remove them. New trees cannot replace such trees within short space of time. The loss of tree benefits and public/private amenity is immediate and replacement time frames are in the order of decades for larger trees.

Alternatively trees in poor condition and/or with short useful life expectancy are normally recommended for removal on the basis that the effort and cost of retention through the development is not commensurate with short term amenity value, or risk a tree may pose if it fails. Removal of the tree and establishing a new tree with a long life expectancy is a better option. Additionally the tree in poor condition often has little ability to cope with significant changes in its root zone from the development impact.

Where trees have major impacts to the tree protection zone then removal is likely the best alternative unless the tree is significant and specific measure can be developed to assist the tree through the development.

It should be noted that the calculated tree protection zone (TPZ) is for the most part the minimum space required for the tree to maintain viability and stability, and the actual tree root zone will in most instances extend well past the calculated TPZ; meaning that if the development encroaches up to the TPZ a large amount of roots and root space is still lost for the tree.

B. Trees to Retain. Trees 1, 4 & 13 – the three council street trees are recommended for retention with impacts to manage.

C. All other trees within the lot boundaries are recommended for removal.

D. Tree Protection Measures.

- Tree Protection measures should form part of the site project demolition and construction plan – **A tree Protection Plan – for tree numbers 1, 4 and 13.**
 - The Tree protection Plan should be formulated as part of the demolition contract and reviewed as implemented by Council (or other relevant authority) prior to commencement of demolition.
 - It should remain current for the construction phase.
- Trees identified for retention should have effective Tree Protection fencing erected prior to commencement of demolition and construction.
- There should be no parking of vehicles, or plant or storage of any materials within the TPZ of the retained trees.

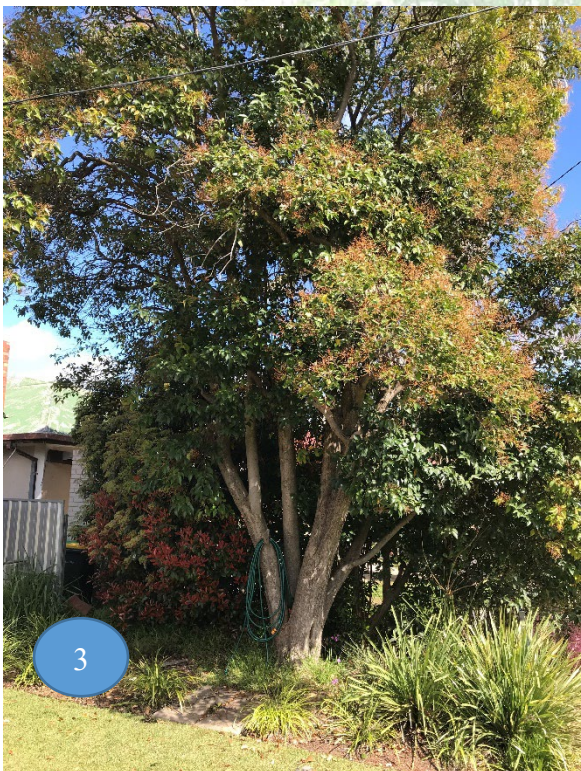
- Other specific measures outlined in *Australian Standard 4970 -2009 protection of trees on development sites* may be appropriate once final works are determined.
- There should be no trenching or excavation works within the TPZ without prior consultation with Level 5 Arboricultural consultant to evaluate the impacts on the trees. This specifically includes, trenching for services, electricity, water, gas communications sewer or irrigation pipes, general earth works, including landscaping, that disturbs the soil profile.
- Boring of post holes in the order of 150 mm diameter for the erection of fence posts are identified as an acceptable impact within the TPZ, but not excavation of soil for the laying of strip footings.
- Any specified pruning, or clearance pruning of trees should be conducted before commencement of any works so that an effective tree protection barrier (fence) can be installed and the canopy not damaged by demolition or construction process.
 - Structured pruning of tree 4 is required to clear the canopy on the west side for construction of the new driveway and ongoing vehicle access and egress.
 - Root pruning – clean cutting with a saw of any root over 25 mm diameter after excavation for the new driveway will be required.
- The three retained trees are WWCC Trees; it should be considered to inform Council prior to commencement of demolition so that the Tree Management Officer has the opportunity to review/supervise tree 4 pruning, installation of protection fencing and potentially supervise the excavation for the new driveway boxing.

There is little point in trying to preserve trees through a demolition and construction project if the development does not respect the requirements of the trees.

- E. The loss of the tree benefits should be offset at the conclusion of the construction phase by an appropriate landscaping plan. Trees can easily be expected to reduce radiant heat in the order of 5 to 7 degrees by shading hard stand and other ground surfaces (Kaluarachichi et al 2020).

Reference.

Kaluarachichi T.U.N., Tjoelker M.G. and Pfausch S. (2020). *Temperature Reduction in Urban Surface Materials through Tree Shading Depends on Surface Type Not Tree Species*. *Forests* 2020, 11, 1141.



Photos 1 – 3 – examples of tree evaluated for removal – and recommended for removal.

Photo 1 – Tree 12 Thuja orientalis (Book leaf pine). Insignificant shrub with very low environmental and amenity values.

Photo 2 – Tree 9 - Callistemon Species (Bottle Brush) – with low environmental values and low amenity values.

Photo 3 – Tree 14 Ligustrum lucidum (Broad leaf privet) – Listed weed species within WWCC Development Control Plan.



Photo 4 – Tree 2 - Fraxinus 'Raywood' (Claret Ash).

Front yard of property number 18. Tree evaluated as 'Retain if possible' a tree with positive amenity values and expected useful life expectancy 15 plus years. The building footprint is in direct conflict with the tree and it will have to be removed. This is the only tree within the development site that is subject to WWCC Development Control Plan 2010 -PART B Section 5 Natural Resource and Landscape Management 5.2 preservation of trees.



Photo 5 – Tree 4 *Melaleuca linariifolia* (snow-in-summer).

WWCC Street tree outside number 20. White line indicates proximity of the driveway to be constructed. This is at the edge of the structural root zone. The tree will require canopy lifting on the west side (new driveway side – circled area) to allow construction activity and ongoing vehicle access and egress from the new site. Pruning works should be supervised by the WWCC Tree Management officer or his delegated representative.

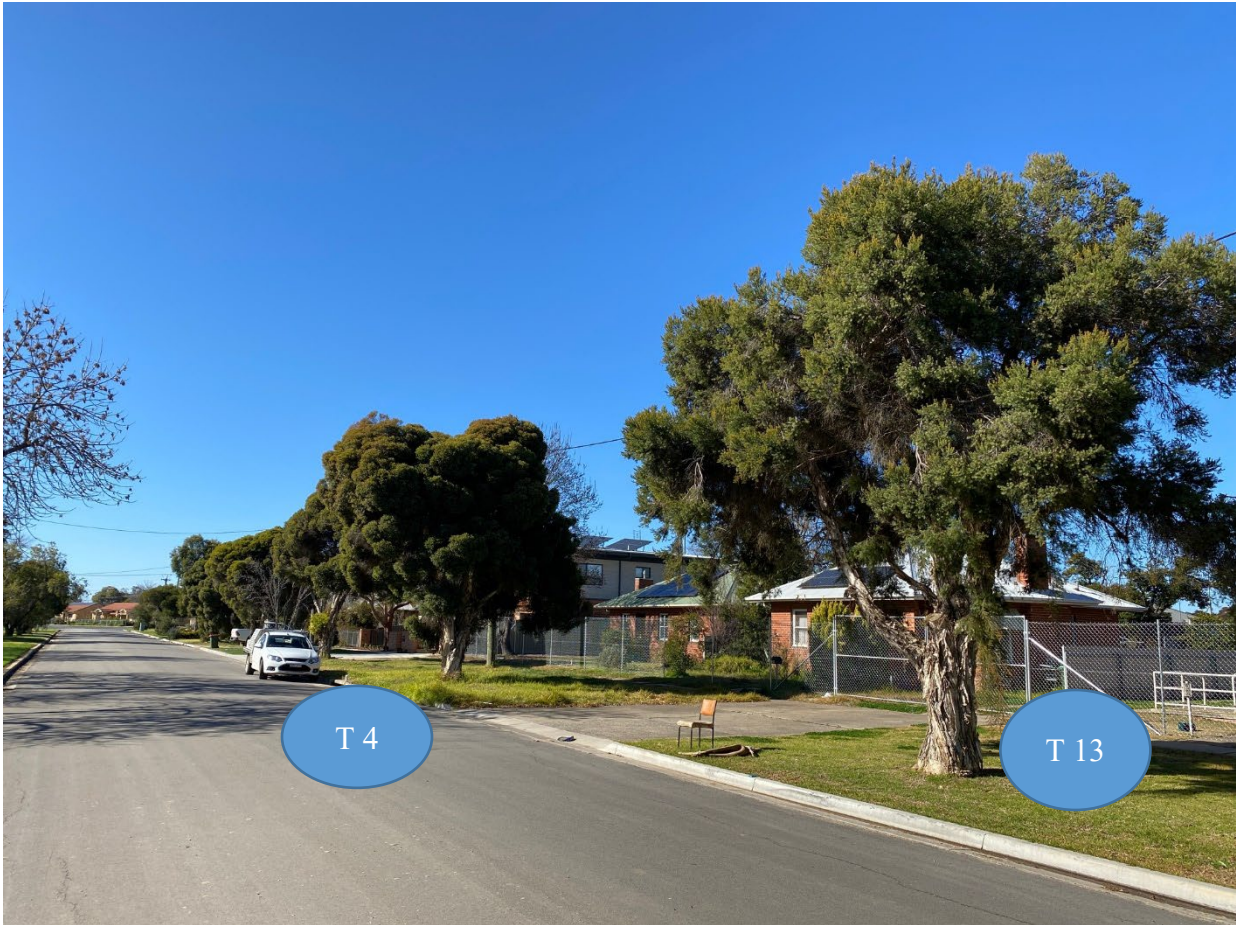


Photo 6 – Depiction of trees 13 in foreground Melaleuca linariifolia (snow-in-summer) – then tree 4 near utility

Then further trees of same maturity and species along the street scape. Tree 4 forms a notable portion of the streetscape and can be retained.

Terms, Conditions and Limitations that apply.

Obviously, visual tree assessment from the ground has some limitation as every single portion of the tree cannot be observed or inspected. Most or the large majority of tree conditions, factors or issues can be observed from the ground. Where aerial inspection or other investigative means should be considered the report or email will recommend or provide those as an additional considerations. The integrity of the root zone of trees can often be difficult to determine from visual inspection – particularly on steep slopes and on shallow soil profiles. Unless there are indicators of some instability then most trees are effectively accessed as stable as part of Visual Tree Assessment.

Trees are a valuable asset and necessary part of both the urban and natural environment. They are the cornerstone of our environment and provide numerous benefits to our social wellbeing, biodiversity and ecology of any area. They provide water balance stability, salinity and erosion control, amenity, cultural, public health and aesthetic benefits; efforts should be made to

preserve and plant new trees where possible. As an asset they require appropriate management and resource inputs.

It should be noted that trees cannot be guaranteed 'risk free'. All trees represent some degree of risk. Arboriculture is not an exacting science; rather it is an educated interpretation of the interaction of biotic and environmental circumstances, which change over time. It is not possible to determine or predict all limb or tree failures. This report is such an interpretation at the time of inspection.

Unless Quantified Tree Risk Assessment (QTRA) has been specifically applied and reported, then this report or email does not constitute a risk assessment. The Author does not seek to determine what level of risk any individual or organisation is prepared to accept but serves to provide tree managers with tree condition, hazards and other salient issues or factors associated with the tree or trees; and provide or recommend management options.



3 August 2022

Wade Ryan Contracting – Independent Arboriculture Consultant AQF Level 5.

BAppSc(EnvHort) – AdvDip OH&S

Institute of Australian Consulting Arboriculturists (IACA) Accredited Member (ACM 0622018)

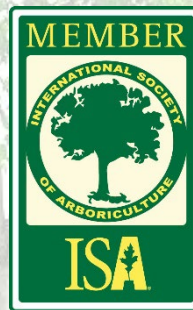
QTRA – Registered Advanced User (4519).

Member - International Society of Arboriculture

Associate Member – The Arboriculture Association (UK)



AS8205.

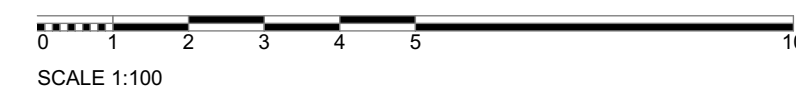
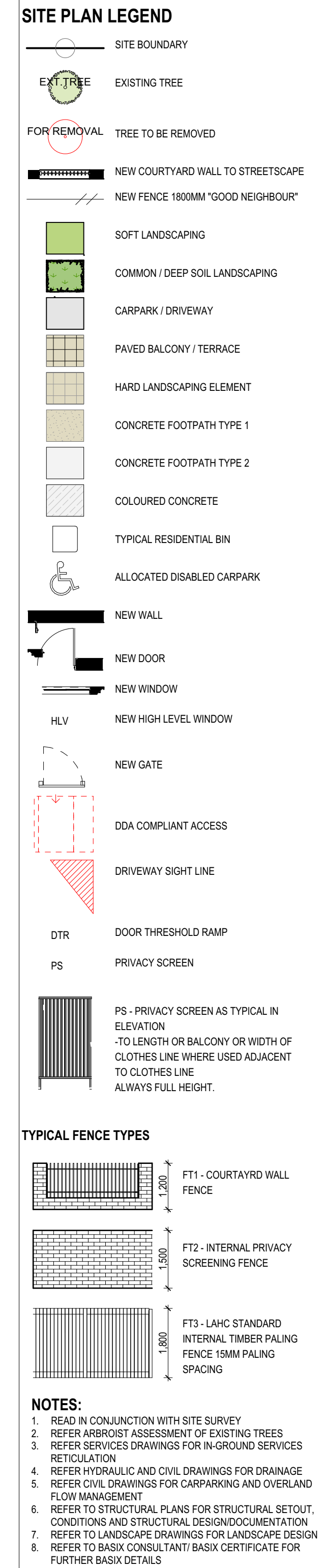
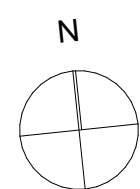


™ ISA Member : 257486



Quantified Tree Risk Assessment

4519



SCALE 1:100

Developed Wade Ryan Contracting 0408 300 989 waggatreeconsultancy.com.au waderyan1@bigpond.com		Annexure 1 - Tree Date File - 18 - 22 Spring Street Wagga Wagga - 2021 - Updated 3/08/2022 for Imapct Assessment Report																						
Tree No	Species	General Location	Species Origin	General Size	Age Class	Height M	Canopy Ø	DBH (m)	SRZ Radius in m	TPZ Radius in m	Canopy Area (M²)	Tree Vigour	General Condition	Defects/Hazards/Issues Present Commentary on tree	Enviro Rating (Values)	Expected Remaining Life	Replacement Time Frame	Significant Tree Status	Retention Value	Recommended Action for planning of development	Primary Reason for Recommendation	Development Proposal	Primary Reason	Other Comments
1	Melaleuca linariifolia (snow-in-summer)	18 Spring WWCC nature strip	Aus Native	Medium	Mature	8	8	0.38	2.20	4.56	50.2857	1 - Excellent	2 - Good	Multi stemmed tree with some weakness in the stem unions - not considered high risk.	3 - Medium	15 plus	10-20	Not Significant	1 - Excellent	Retain	Sound tree suited to site	Retain - Impacts to Manage	Sound tree suited to site	WWCC Street Tree - well established with long remaining life - forms part of a mature line of street trees
2	Fraxinus 'Raywood' (Claret Ash)	18 Spring Front Yard	Exotic	Medium	Semi Mature	12	10	0.4	2.25	4.8	78.5714	1 - Excellent	2 - Good	Multi stem tree - low risk of failure - tree presents as sound and in good condition.	4 - Low	15 plus	10-20	Not Significant	2 - Good	Retain if possible	Positive amenity values	Remove	Direct Conflict with DA	Can not be retained within this proposal
3	Ligustrum lucidum (broad leaf privet)	18 Spring Back yard	Exotic	Small	Semi Mature	4	3	0.17	1.57	2.04	7.07143	1 - Excellent	2 - Good	Weed species - germinated from seed dropping	5 - Very Low	40 plus	0-5	Not Significant	5 - Very Poor	Remove Priority	Exempt species	Remove	Direct Conflict with DA	Environmental weed - remove (NSW DPI 2020)
4	Melaleuca linariifolia (snow-in-summer)	20 Spring WWCC Nature Strip	Aus Native	Medium	Mature	8	9	0.57	2.61	6.84	63.6429	1 - Excellent	2 - Good	Sound tree	3 - Medium	15 plus	10-20	Not Significant	1 - Excellent	Retain	Sound tree suited to site	Retain - Impacts to Manage	Sound tree suited to site	WWCC Street Tree - well established with long remaining life - forms part of a mature line of street trees - direct impacts to manage from proposed driveway Impact to TPZ 27% edge of SRZ - canopy pruning and other mesures required.
5	Cupressus sempervirens - (Swanes Golden)	20 Spring Front Yard	Exotic	Small	Semi Mature	2.5	1.5	0.15	1.50	1.8	1.76786	2 - Good	2 - Good	Small exotic tree	5 - Very Low	5 to 15	0-5	Not Significant	4 - Poor	Remove	Exempt height	Remove	Direct Conflict with DA	Trees easily replaced in 2-3 years within new landscape plan
6	Cupressus sempervirens - (Swanes Golden)	20 Spring Front Yard	Exotic	Small	Semi Mature	2.5	1.5	0.15	1.50	1.8	1.76786	2 - Good	2 - Good	Small exotic tree	5 - Very Low	5 to 15	0-5	Not Significant	4 - Poor	Remove	Exempt height	Remove	Direct Conflict with DA	Trees easily replaced in 2-3 years within new landscape plan
7	Callistemon Species (Bottle Brush)	20 Spring Street front yard - boundary of 18	Aus Native	Small	Semi Mature	6	4	0.2	1.68	2.4	12.5714	2 - Good	3 - Fair	Tall upright form	4 - Low	15 plus	0-5	Not Significant	4 - Poor	Remove	Exempt height	Remove	Direct Conflict with DA	Trees easily replaced in 2-3 years within new landscape plan
8	Prunus species (Ornamental Plumb)	20 Spring Street front yard - boundary of 18	Exotic	Small	Young	4	3	0.1	1.50	1.2	7.07143	2 - Good	4 - Poor	Tree has seeded in location - weed	5 - Very Low	5 to 15	0-5	Not Significant	5 - Very Poor	Remove Priority	Exempt height	Remove	Direct Conflict with DA	
9	Callistemon Species (Bottle Brush)	20 Spring Street - back yard boundary of 18	Aus Native	Small	Young	6	4	0.125	1.50	1.5	12.5714	2 - Good	2 - Good		4 - Low	15 plus	0-5	Not Significant	4 - Poor	Remove	Exempt height	Remove	Direct Conflict with DA	Trees easily replaced in 2-3 years within new landscape plan
10	Callistemon Species (Bottle Brush)	20 Spring Street - back yard boundary of 18	Aus Native	Small	Young	6	6	0.15	1.50	1.8	28.2857	2 - Good	2 - Good		4 - Low	15 plus	0-5	Not Significant	4 - Poor	Remove	Exempt height	Remove	Direct Conflict with DA	Trees easily replaced in 2-3 years within new landscape plan
11	Unidentified Shrub	20 Spring St back yard middle	Exotic	Very Small	Mature	2	3	0.15	1.50	1.8	7.07143	2 - Good	2 - Good		5 - Very Low	5 to 15	0-5	Not Significant	5 - Very Poor	Remove	Exempt height	Remove	Direct Conflict with DA	Trees easily replaced in 2-3 years within new landscape plan
12	Thuja orientalis (Book leaf pine)	20 Spring Street back yard fence 22 spring	Exotic	Small	Mature	5	6	0.15	1.50	1.8	28.2857	1 - Excellent	2 - Good		5 - Very Low	0 to 5	0-5	Not Significant	5 - Very Poor	Remove	Exempt height	Remove	Direct Conflict with DA	Trees easily replaced in 2-3 years within new landscape plan
13	Melaleuca linariifolia (snow-in-summer)	22 Spring St WWCC Nature Strip	Aus Native	Small	Mature	7	8	0.57	2.61	6.84	50.2857	2 - Good	2 - Good		3 - Medium	15 plus	10-20	Not Significant	1 - Excellent	Retain	Sound tree suited to site	Retain - Impacts to Manage	Sound tree suited to site	WWCC Street Tree - well established with long remaining life - forms part of a mature line of street trees
14	Ligustrum lucidum (broad leaf privet)	22 Spring st front yard boundary of 24	Exotic	Medium	Mature	9	9	0.4	2.25	4.8	63.6429	2 - Good	2 - Good		5 - Very Low	15 plus	5-10	Not Significant	5 - Very Poor	Remove Priority	Exempt species	Remove	Direct Conflict with DA	Environmental weed - remove (NSW DPI 2020)

412.893
170
1560
26%
15%

Total Canopy coverage
 Recommended for removal
 Development Site area - square meters
 Site canopy coverage including WWCC Street trees that are outside development area.
 Site canopy coverage excluding WWCC street trees.

Annexure 1 - Assessment and Evaluation criteria - Definitions.									
Origin		General Tree Size		Age Class		General Condition - summation of all considerations. Includes Stem/Canopy Structure Defects, Form, Canopy Vigour, Extent of any decay, Pest and Disease influences	ERL estimated remaining life in years under current Situation	Tree Vigour	Retention value
Endemic	Species is native to this location	Very Large	> 25m	New	Recent Planting - last year or two	1 - Excellent	0	1 - Excellent	1 - Excellent Interpretation Based on overall tree condition, species performance in local environment, expected remaining life and significance of tree in landscape
	Aus Native	Large	18-25m	Young	Sapling, extended growth remaining	2 - Good	0 to 5	2 - Good	
Exotic	Species introduced to Australia	Medium	10-18m	Semi Mature	Some remaining growth to reach maturity for the site and species	3 - Fair	5 to 15	3- Fair	
		Small	< 10m	Mature	Considered mature size for site and species - typically no sign of decline	4 - Poor	15 plus	4 - Poor	
		Very Small	< 3m	Over Mature	Tree has commenced to decline - obvious signs	5 - Very Poor	40 plus	5 - Very Poor	
				Senescent	Extended signs of decline - recovery not expected				
				Dead	Little or no metabolic function remaining				

Environmental Rating	Environmental Evaluation Considerations/criteria
1 -Very High	Normally Old growth Remnant Tree, multiple hollows important to endangered fauna, replacement would be well in excess of 150 years Mature or semi mature Endemic Tree with or without hollows, plays an important part in local ecology, or Australian Native that has high substitute values as endemic tree replacement would take 50-100 years Young or semi mature Endemic tree or Australian native species that has some positive values for local fauna/ecosystems - replacement would take 20 or more years. Large Exotic tree with elevated general values. Normally exotic species, or small, young endemic or native that could be replaced in the short term 5-10 years Listed Weed or nuisance species; or very small value or insignificant to local ecology - could be replaced within 5 years or readily replaced with species of greater value
2 - High	
3 - Medium	
4 - Low	
5 - Very Low	

Significant Tree value considerations/criteria	
Very Significant	Defined as Significant Tree by regulatory or other authority or
	Environmental rating 1 or
	Heritage Listed or
	Very High Cultural or heritage Values
Significant	Environmental rating 2 or
	Medium or large tree in good/excellent condition, suited to local environment or
	imposing within the local landscape with long life expectancy and or
	strong amenity values or some cultural or heritage links

Recommended Action for DA	Primary Reasons
Retain Priority	Very Significant tree
Retain	Significant Tree
Retain if possible	Sound tree suited to site
Remove	Positive amenity values
Remove Priority	Poor Condition
	Unsuitable for location
	Species not suited to Environment
	Condition & Safety
	Replaced in short term
	Direct Conflict with DA
	No impact
	Exempt species
	Exempt height
	Weed Species
	Other

Picks		
Replacement times	1	Very significant
0-5	2	Significant
5-10	3	Not Significant
10-20	4	
20+	5	Yes
50+		No
100+		
Known Development Impact		
Remove		
Retain - Impacts to Manage		
Retain - Impacts unlikely		
Not determined		

Tree Height and canopy spread is estimated unless otherwise specified.

Tree stem diameter is measured at approximately 1.4m above - or at a point indicative of the tree dimension where abnormal growth occurs at 1.4m above ground. Multi stemmed trees are calculated as per AS 4970

TPZ – Tree Protection Zone - specified area above and below ground and at a given distance from the trunk set aside for the protection of the tree’s roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development.

SRZ - Structural Root Zone – the area around the base of a tree required for the tree’s stability in the ground - calculated in meters radially from stem centre.

From *Australian Standard 4970-2009 Protection of Trees on development sites*

TPZ and SRZ are calculated from AS 4970

Tree canopy area is a calculated area from the diameter of the of the canopy - some actual variation may exist in the calculation if the canopy is not symmetrical.