Construction Impact Assessment and Management Plan

Site Address: Westfield Penrith
Prepared for: Scentre Group
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Dated: 26th February, 2019

Contents

1.0 INTRODUCTION

1.1 Background

1.1.1 This Construction Impact Assessment and Management Plan has been prepared for, and in consultation with Scentre Group on behalf of the property owner. This has been done to detail the arboricultural impacts associated with the alterations and additions to the Westfield Shopping Centre in Penrith.

1.1.2 It has been reported that the Shopping Centre was constructed in 1971. Although the site has been partially remodelled throughout the period, the space no longer appropriately facilitates the changing demographic and social requirements of the surrounding environment. The proposed alterations will re address the arboricultural context of the existing trees and make proposals for the reintroduction of locally native species for a number of environmental and social reasons.

1.1.3 The purpose of this report is to identify all existing trees, assess both health and condition, determine landscape significance and life expectancy. A determination for preservation, removal or transplantation will be made based on sustainability and suitability within the setting. For the purpose of this report *Botanics* has assessed the likely impact that the proposed development will have on the subject trees. This report will then provide recommendations in relation to the management of these in accordance with Australian Standard (AS) *4970 for the Protection of Trees on Development Sites.* Pruning and removal works will be based on *AS4373 for the Pruning of Amenity trees* where applicable.

1.1.3 The impacts of the proposed works have been assessed based on the following supplied plans:

- Existing and Demo Level 1 Floor Plan Mondo Precinct SK01.02

1.2 The Proposal

1.2.1 The supplied plans show that the works will require;

- The extension of the southern and western building footprints adjacent to the Joan Sutherland Centre.

2.0 RESULTS

2.1 The Site

2.1.1 The site comprises both public and private open space providing pedestrian access to the Westfield complex, the Joan Sutherland Performing Arts Centre, as well as, the Penrith City Library and Penrith Council. The site also provides vehicular access to the car parking facility with access from High Street as detailed.

2.2 The Trees

2.2.1 A total of twenty seven (27) trees have been assessed using Visual Tree Assessment (VTA) criteria and notes. As required under Clause 2.3.2 of the Australian Standard 4970 (2009) for the Protection of Trees on Development Sites, each tree has been allocated a Retention Value based on the tree's Useful Life Expectancy and Landscape Significance with consideration to its health, structure, condition and site suitability. The Retention Value does not take into account any proposed development. All trees have been allocated 1 of 4 Retention Values;

- High Value - Priority for Retention.
- Moderate Value - Consider for Retention.
- Low Value - Consider for Removal.
- Remove - Recommended for Removal Irrespective of works.

Refer to Tree Table and Tree Assessment Schedule.

2.2.2 The site's arboricultural amenity contribution comes from a number of well established trees. These comprise a number of palms located within the front courtyard and documented as Trees 2 and 3. The remaining trees comprise a range of species located within the rear courtyard documented as Trees 4, 5 and 6.

2.2.3 Trees 1, 2 and 3 are all *Robinia pseudoacacia,* or False Robinia trees located on the eastern edge of the adjacent Council reserve. These are all semi mature examples of their species that have failed to fully develop in this location and have been rated as Low Value.

2.2.4 Trees 4, 5, 6 and 7 are all J*acaranda mimosifolia,* or Jacaranda trees. These have all been planted adjacent to the building's south western corner and have developed with compromised canopies due to their phototropic response to the shadowing of the adjacent building and their neighbours.

2.2.5 Trees 8 and 9 are both well established, yet semi mature Ficus benjamina, or Benjamina Figs. These have been a popular indoor ornamental plant that may have been planted here as part of some more recent landscape works. These are both supported on trunks that are included and will not have been purchased, or planted following NATSPEC Guidelines for the nursery tree plantings. While both remain in good health, they are structurally compromised and remain a small fraction of their full biological potential and have been given a Removal recommendations, irrespective of the proposed development.

2.2.6 Tree 10 and 11 are both *Jacaranda mimosifolia's* that have developed with three (3) leaders that fork from ground level and are partially included. These are structural faults that will undermine their arboricultural significance, although their locations and the nature of these inclusions limit the hazard associated with them here.

2.2.7 Trees 12 - 19 comprise a stand of semi mature *Gleditsia tricanthos,* or Honey Locust. These will all have been planted within the past twenty (20) years and have been planted too close to each other to allow for the development of full and independent canopies. Several have become suppressed by dominant neighbouring

trees and all have developed a network of surface roots. As such, all have been considered as Low Value due to their exotic provenance, poor form and associated species characteristics.

2.2.8 Tree 20 is a semi mature *Annona montana* or Mountain Soursop. This tree will have been planted here as part of more recent planting works and has developed relatively well. The tree has grown to a height of approximately 12m and holds a full canopy. The tree has been given a Moderate Value and should be considered for retention.

2.2.9 Trees 21, 22, 23, 24 and 25 are all Gleditsia's that have been planted within relatively small planters between the building's southern footprint and the northern edge of the neighbouring carpark. All have developed with relatively thin and lightly foliated canopies due to both the limited availability of soil moisture and nutrients and limited access to sun light. All have been given a Low Value for these and the exotic nature and species characteristics.

2.2.10 The final trees assessed are the two (2) *Gleditsia* on the eastern side of the pedestrian access way adjacent to the southern edge of the building footprint. These have developed better due to improved solar access, as well as, reduced competition.

3.0 ARBORICULTURAL IMPACT ASSESSMENT

3.1 Trees 1, 2 and 3 have all failed to develop to their potential due to a range of reasons. Trees 1 and 2 both show die back with dead wood throughout their upper canopies. Tree 3 has a large section of visible decay from ground level. All are however located outside the construction impact zone of the proposed works and have been documented for retention despite their Low Value.

3.2 Trees 4, 5, 6 and 7 are all *Jacaranda mimosifolia's* located on the southern edge of the existing building footprint. Trees 5 and 6 are both suppressed by their neighbours trees (T4 and 7), as well as, the phototropic effect of the building footprint. This has resulted in the development of canopies that protrude further south, as well as, promoting the growth of surface roots.

3.3 Trees 8 and 9 are both *Ficus benjamina,* or Benjamina Figs. As noted, these were a popular indoor ornamental tree that appear to have been planted following a period of its juvenile life spent as an indoor tree. These trees may have started as multiple tube stock and allowed to develop as a single specimen. This does not comply with NATSPEC standards for the nursery plant stock and should not have been planted here. Both trees have been recommended for removal irrespective of the proposed development for these reasons.

3.4 Trees 10 and 11 are both well established Jacaranda's located centrally within the courtyard. These trees have both developed on three (3) leaders, all of which seperate at ground level and appear to be partially included. This is a structural fault that can lead to the failure of the subdominant leader, although the relatively protected nature of this location and the tree's current good health will limit the practical hazard associated with this.

3.5 Trees 12 - 19 comprise a stand of juvenile to semi mature *Gleditsia tricanthos* that have been planted in a formal grid formation within an external courtyard. These have all been planted within 3m of each other and

have partially suppressed their neighbours. This, and the phototropic nature of the species has resulted in the formation of canopies that have developed on leans, predominantly to the north and west to gain solar access. All have developed with a network of exposed surface roots that is a common issue with the species.

3.6 Tree 20 is a well established example of the Annona montana species that is likely to have been transplanted here as a semi mature tree. This tree has established well in this location although it is unlikely to flourish.

3.7 Trees 21, 22, 23, 24 and 25 comprise another small stand of Gleditsia that have been planted within smaller planters between the buildings southern boundary and the carparks north western corner. Again, these have been affected by both the shadowing that comes from the surrounding buildings and the limited volumes of soil available in the planters. This has resulted in the development of less full canopies that would otherwise be expected and trees that have developed on varying leans to better gain solar access.

3.8 Tree 26 and 27 are the remaining Gleditsia's documented. These are both located further to the east of the previously detailed Gleditsia's and are in better condition due to reduced competition for soil moisture and nutrients.

4.0 DISCUSSION

4.1 The proposed works will involve the extension of the construction footprint south as detailed. This will require the removal of Trees 4, 5, 6, 7, 8, 9, 21, 22, 23, 24 and 25. The extension of the construction footprint to the west will affect Trees 11,16, 17, 18 and 19 and most likely require their removal.

4.2 Both of the Jacaranda's documented (Trees 10 and 11) have developed on three (3) multiple trunks that fork from ground level. This is both a coincidence and structural fault that has undermined the arboricultural significance of each of these trees. Although well established both have been considered as Low Value for these reasons. Tree 10 is located centrally within the courtyard, while Tree 11 is located adjacent to its western boundary. The proposed construction has however been set back to allow for its retention.

4.3 The *Gleditsia tricanthos* (Trees 12-19 and 21-27) are a well recognised Class 3 Environmental Weed Species http://www.environment.gov.au/cgi-bin/biodiversity/invasive/weeds/weeddetails.pl?taxon_id=21077. and should not have been planted here for a broad range of reasons. Although providing a canopy in an urban area the species is not suitable for long term retention and all have been recommended for removal to allow alternative planting opportunities to be explored.

4.4 Tree 20 is a well established *Annona,* or Soursop tree https://en.wikipedia.org/wiki/Annona. As noted, this will likely have been transplanted here as part of some more recent planting works. This exotic species is out of context here and although Moderately significant and considered for retention, is required for removal to allow the proposed works to occur.

5.0 CONCLUSIONS

5.1 The proposed works improve both pedestrian and vehicular access to the site, as well as view lines and visual amenity throughout the site.

5.2 The proposed plantings will improve long term horticultural and arboricultural amenity, as well as creating a sense of place within the context of the surrounding landscape.

6.0 BIBLIOGRAPHY & REFERENCES

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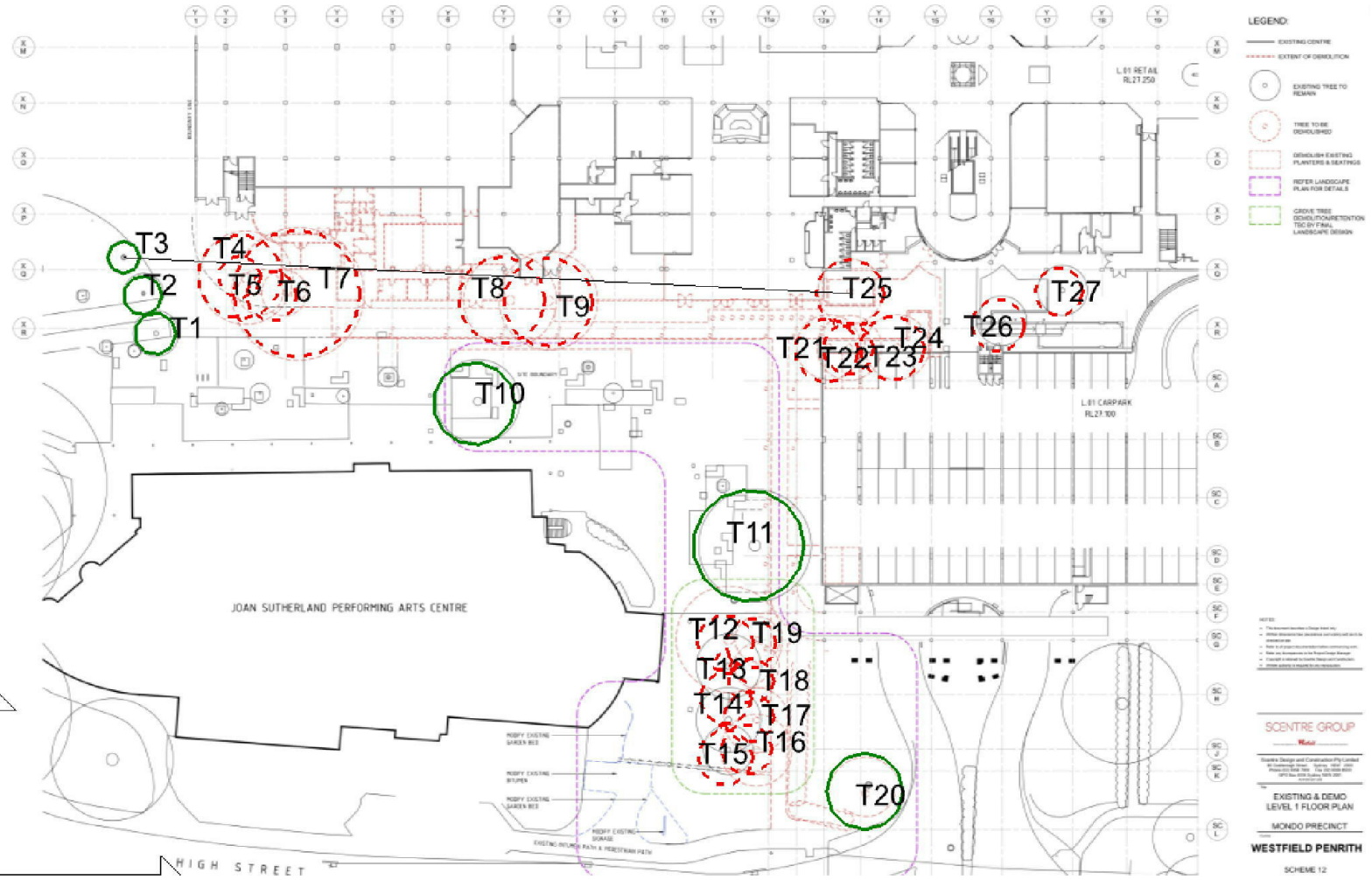

Figure 1 Shows the locations of the documented trees in relation to the existing and proposed.

Figure 2 Shows the Jacarandas documented as Tree 4,5,6 and 7.

Figure 3 Shows the basal inclusions on Tree 10.

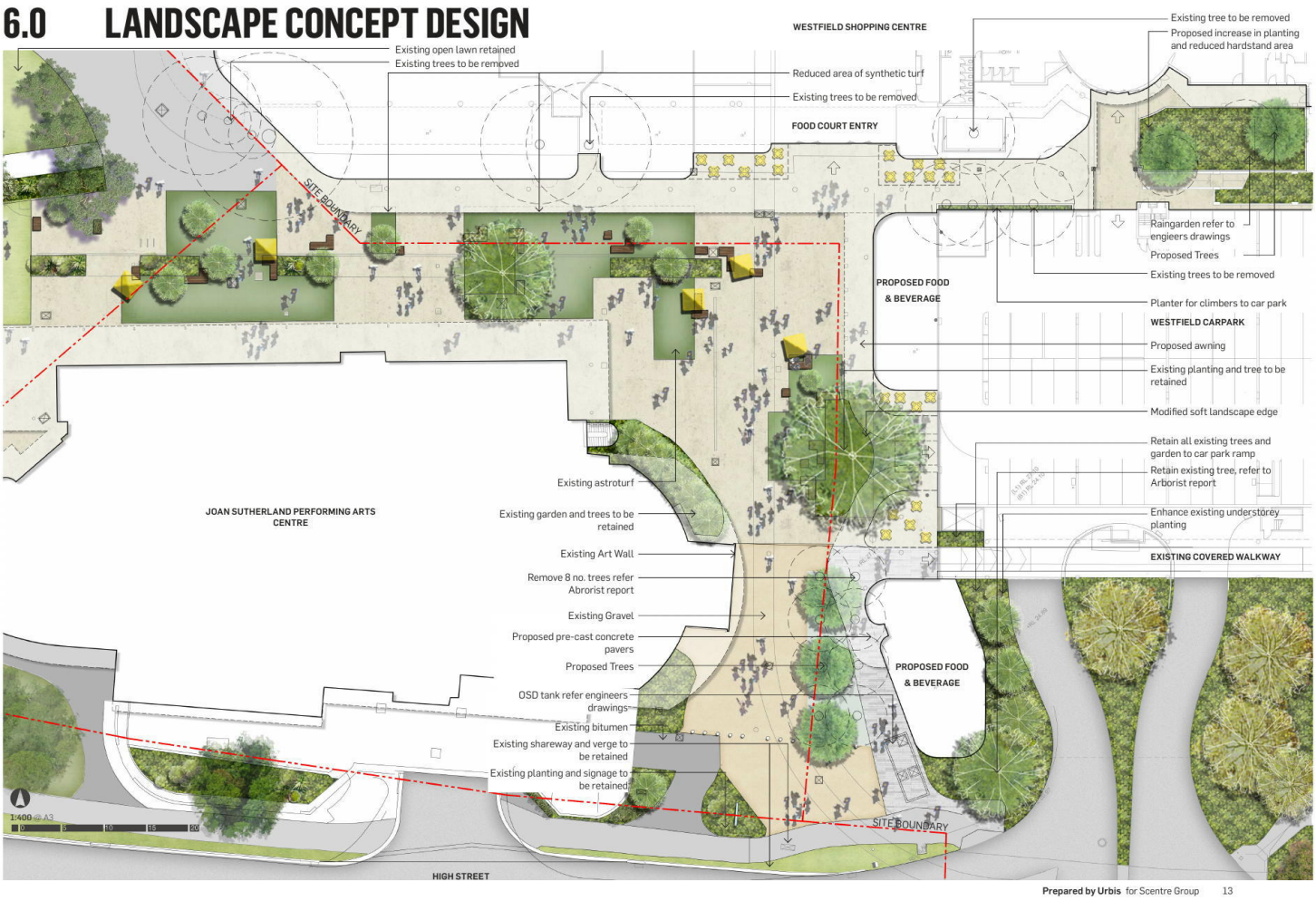

Figure 4 Shows a detail of the proposed setback in relation to Tree 11.

Tree Table for Westfield Penrith.

T#	Species	Remnant Native, Exotic.	Age Class	Canopy Height and Spread.	Trunk Diameter DBH	Basal Diameter DGL	Significance	Amenity value	Ecological Value	Defects	SRZ	TPZ	Implications
T1	Robinia pseudoacacia (False robinia)	E	SM	6 x 3	22cm	26cm	Low	Low	Low		2m	3m	Part of a stand of similar trees within the adjacent Council Park land.
T2	Robinia pseudoacacia (False robinia)	E	SM	6 x 4	34cm	36cm	Low	Low	Low		2.5m	4m	As above.
T3	Robinia pseudoacacia (False robinia)	E	SM	6 x 4	42cm	43cm	Low	Low	Low	D, I	2.5m	4m	Partially included with visible surface decay.
T4	Jacaranda mimosifolia (Jacaranda)	E	SM	8 x 6	38cm	40cm	Moderate	Moderate	Moderate		2.5m	4m	Developed with a lean to the west due to phototropic affect of building line.
T5	Jacaranda mimosifolia (Jacaranda)	E	SM	6 x 2	32cm	36cm	Low	Low	Low	S	2m	5m	A poorly structured example of the species.
T6	Jacaranda mimosifolia (Jacaranda)	E	SM	7 x 4	20cm	22cm	Low	Low	Low	S	2m	5m	A semi mature example do the species that has developed on a co dominate and partially included trunk.
T7	Jacaranda mimosifolia (Jacaranda)	E	SM	8 x 8	36cm	40cm	Low	Low	Low		2m	4m	Lean over courtyard and exposed surface root development.
T8	Ficus benjamina (Benjamina fig)	E	SM	14 x 5	45+	50cm	Low	Low	Low	I	2.5m	6m	A poorly structured example of the species located adjacent to the existing construction footprint. Poor structure biological potential beyond site parameters.

Tree Table for Westfield Penrith.

T#	Species	Remnant Native, Exotic.	Age Class	Canopy Height and Spread.	Trunk Diameter DBH	Basal Diameter DGL	Significance	Amenity value	Ecological Value	Defects	SRZ	TPZ	Implications
T9	Ficus benjamina (Benjamina fig)	E	SM	14 x 5	45+	5-cm	Low	Low	Low	I	2.5m	6m	As above. Neither suitable for retention irrespective of the proposed.
T10	Jacaranda mimosifolia (Jacaranda)	E	SM	12 x 10	3 x (28+30 +32cm)	50cm	Low	Moderate	Low	I	2.5m	5m	A semi mature example of the species located centrally within the space. 3 leaders all included undermine significance.
T11	Jacaranda mimosifolia (Jacaranda)	E	SM	10 x 10	3 x (33+38 +43)	50cm	Low	Moderate	Low	I	2.5m	5m	Another semi mature Jacaranda that has developed on multiple leaders at ground level.
T12 - T19	Gleditsia tricanthos (Honey locust)	E	J	7 x 5m	10 - 30cm	15 - 40cm	Low	Low	Low	W	NA	NA	A Class 3 Environmental Weed species recommended for removal irrespective of the proposed.
T20	Annona montana (Soursop)	E	SM	12 x 10m	4 x (24+42 +24+20)	50cm	Moderate	Moderate	Moderate		3.2m	8m	A well established example of this unusual tree species.
T21 -27	Gleditsia tricanthos (Honey locust)	E	J	6 x 4	10 - 30cm	20-40cm	Low	Low	Low	W	NA	NA	A Class 3 Environmental Weed species recommended for removal irrespective of the proposed.

Tree Table for Westfield Penrith.

Genus, Species, and Common name
The botanical and common name of each tree is identified and recorded. Occasionally the exact species name is unknown; sp. Is recorded to indicate this.

Height, Spread, Trunk Diameter, DBH and DRB
The Trees height and spread are recorded in meters.
The tree DBH is recorded in millimeters. DBH is an abbreviation of diameter (of the trunk) measured at breast height (or 1.4 meters from the base of the trunk). If more than one trunk is present the DBH is calculated in accordance with AS4970-2009 Protection of Trees on Development Sites.
If the tree has multiple trunks each trunk DBH will be recorded individually.
The tree DRB is recorded in millimeters. DRB is an abbreviation of Diameter (of the trunk) measured above the root buttress. It is required to calculate the SRZ in accordance with AS4970-2009 Protection of Trees on Development Sites when there is major encroachment within the TPZ, i.e. greater than 10% is encroached upon or if there is an encroachment within the SRZ.

Age
The age class of each tree is estimated as either:

J- Juvenile, a young sapling, easily replaced from nursery stock

SM- Semi mature, a tree that has not grown to mature size

M- Mature, a tree that has reached mature size and will slowly increase in size over time.

OM- Over mature, a tree that has been mature for a long period and is beginning to display signs of decline, e.g. large dead branches

S- Senescent, an over mature tree that is now in decline

Health
The Tree's health is recorded as a measurement of:

G- Good, the does not appear stressed with no excessive dieback, insect infestation, decay, deadwood or epicormic shoots

Avg- Average health, the tree appears stressed and has some crown dieback, and/or areas or few epicormic shoots, and/0r some deadwood in the crown and some new growth at the branch tips. These trees may benefit from remediation of the growing environment to reduce stress and return it to good health.

F- Fair, the tree may have areas of crown die back, and/or many epicormic shoots, and/or reduced new growth at branch tips. These trees have been stressed fort a short period of time; remediation of the growing environment may improve the trees health.

P- Poor, the tree may have large areas of crown die back, and/or many epicormic shoots, and/or reduced new growth at branch tips. These trees have been stressed for a long time, remediation of the growing environment would not return the tree to good health.

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

G- Good Condition: the tree appears to have no visible indication of inherent structural effects.

Avg- Average Condition: the tree has minor structural defects which may be corrected with remedial works or pruning, allowing the tree to return to Good Condition.

F- Fair Condition: the tree has visible structural defects such as (but not limited to) dead branches, and/or an unbalanced crown, and/or leaning trunk and/or signs of decay. These trees do not demonstrate the typical form of their species, of have been damaged or have begun to deteriorate. Remedial works or pruning may return the tree to Average Condition.

P- Poor Condition: the tree has significant structural defects such as (but not limited to) very large dead branches, and/or extremely unbalanced crown, and/or subsiding trunk, and/or large areas of decay. These trees do not demonstrate the typical form of their species, or have been severely damaged or have deteriorated significantly. Remedial pruning would not return the tree to fair condition.

Significance
The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. When determining a trees significance within the landscape context, the following questions are asked.
Significance is measured as high, medium, or low. High being a affirmative answer for 4 or more questions, Medium being 3 affirmative answers, and Low being 2 or less affirmative answers.

- Is the tree a local native remnant; an endangered species, a part of an endangered species community; or does the tree provide critical habitat.

Tree Table for Westfield Penrith.

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 located 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 Environment Weed Species in the Leichhardt 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 a declared Noxious Weed under the Noxious Weeds Act (NSW) 1993 within the relevant Local Government Area.	The tree is completely dead and represents a potential hazard.

Amenity value

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

H- High, the trees form is an excellent example of its species and it makes a great specimen and/or it has other attributes such as screening, or its historical significance. These trees are visually prominent and valuable to the community or public domain.

M- Medium, the tree may have an altered form and/or it has attributes that provide amenity to local residents only.

L-Low, the tree is not a good specimen and it does not provide substantial benefit to local residents or the community.

Ecological value

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

Tree Table for Westfield Penrith.

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

Form

The form, structure or shape of each tree is assessed and recorded as either one or a combination of several of the below terms may be used to describe the trees form; (U) Upright, (B) Broad, (C) Conical, (Sh) Shrub, (CS) Crown Shy (also referenced is the adjacent dominant tree canopy i.e. T4), (V) Vase, (D) Dome, (P) Palm, (S) Spreading, (L) Leaning or (BM) Basal Multi Trunked.
Crown form may also be assessed in accordance with the relationship with the neighbouring tree and recorded as either: S- Suppressed, the crown is located beneath another larger crown and is leaning away (Crown Shy); C- Codmoninant, the crown is adjacent to another crown of similar size, their crown areas may appear joined; D- Dominant, the crown is above the lower crowns; E- Emergent, the crown emerges from a lower canopy formed by the other dominant or codominant crowns.

Defects

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

Structural Root Zone (SRZ

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

$$\text{SRZ (Radius)} = (D \times 50)^{0.42} \times 0.6$$

Tree protection Zone (TPZ)

The TPZ is a circular area with a radius measured by multiplying the DBH by twelve, or a circular area the size of the trees drip line, whichever is greater. This area contains the majority of the essential structural and feeder roots responsible for stability, gaseous exchange and water and nutrient uptake. Excavation, back filling, compaction or other disturbance should not occur in this area. The TPZ is used to identify the minimum area required for the safe retention of a given tree. This calculation is derived from the Australian Standard 4970-2009 Protection of Trees on Development Sites. An incursion to 10% within the TPZ is potentially acceptable if no other option is available. A major encroachment (in excess of 10%) is required to be clearly justified by the project Arborist and compensated for elsewhere. Justification methodology mat vary depending on site or individual trees health, vigor and ability to withstand disturbance may require root investigation.