



**ALL ARBOR SOLUTIONS**

# Arboricultural Impact Assessment

**Prepared for:**

Squillace Architects

**Site Address:**

96-97 North Steyne  
Manly  
NSW  
2095

**Date:**

13 July 2021

**Prepared by:**

Owen Tebbutt  
Consulting Arborist  
Diploma in Horticulture (Arboriculture) Ryde TAFE 2006

# Table of Contents

<b>1.0</b>	<b>Introduction.....</b>	<b>3</b>
1.1	Background .....	3
1.2	Inspection Methodology and Data Collection .....	3
1.3	Trees on Development Sites .....	4
<b>2.0</b>	<b>Findings and Observations .....</b>	<b>6</b>
2.1	The site.....	6
2.2	The Trees.....	6
<b>3.0</b>	<b>Impacts of the Proposed Works .....</b>	<b>7</b>
3.1	General.....	7
3.2	Trees that require removal .....	8
3.3	Trees that can be retained.....	8
3.4	Tree pruning works .....	8
<b>4.0</b>	<b>Conclusions.....</b>	<b>8</b>
	<b>Appendices .....</b>	<b>10</b>
	Appendix 1: Tree Assessment Schedule .....	11
	Appendix 2: Development Impacts Schedule .....	12
	Appendix 3: Tree Location Plan .....	13
	Appendix 4: TPZ encroachments .....	14
	Appendix 5: Site Photographs.....	15
	Appendix 6: Tree Inspection Criteria. ....	16
	Appendix 7: Tree Significance Assessment Criteria & Retention Value Matrix.....	18
	Appendix 8: General Guidance Note for Trees on Development Sites.....	20

# 1.0 Introduction

---

## 1.1 Background

- 1.1.1 This Arboricultural Impact Assessment (AIA) was prepared for Squillace Architects on behalf of the property owners. It relates to the proposed residential development of 96-97 North Steyne, Manly (the site). It concerns the impact of development works on trees located within and adjacent to the subject site.
- 1.1.2 The proposed works involve additions and alterations to the existing multi-level unit block. External alterations include the extension of existing terraced areas off the North Steyne end of the building.
- 1.1.3 The following documentation was reviewed and assists in the preparation of this report:
- Development Application Plans, prepared by Squillace Architects, dated 21.11.2017, drawings DA0010, DA1002, DA1003, DA1004, DA1005, DA1006, DA1007, DA2000, DA2001 and DA3000.
- 1.1.4 The conclusions drawn within this report are based on the information provided and data collected during an on-site inspection.
- 1.1.5 This report is to be used in its entirety only. Any written or verbal submission, report or presentation that includes statements taken from the findings, discussions, conclusions or recommendations made in this report may only be used where the whole original report (or a copy) is referenced to and directly attached to that submission, report or presentation. Information contained in the report covers only the trees that were inspected and reflects the trees condition at the time of the inspection. There is no guarantee, expressed or implied, that problems or deficiencies of the subject trees may not arise in the future.

## 1.2 Inspection Methodology and Data Collection

- 1.2.1 On 23 June 2021 I attended the site to undertake the tree assessment and collect data.
- 1.2.2 The tree(s) were assessed using the principles of a ground based Visual Tree Assessment (VTA)<sup>1</sup> and methods consistent with modern arboriculture. No aerial (climbing) inspection, tissue sampling or diagnostic testing was undertaken as part of the inspection process unless otherwise stated.

---

<sup>1</sup> Mattheck, C. and Breloer, H (2006), *The Body Language of Trees – A Handbook for Failure Analysis*, The Stationary Office. Pages 118-122.

- 1.2.3 Full results of the tree inspection and data collection can be found within the Tree Assessment Schedule (**Appendix 1**).
- 1.2.4 The height, radial canopy spread, trunk Diameter at Breast Height (DBH) and trunk diameter above root buttress was collect for each tree assessed. These physical dimensions were either estimated or measured.
- 1.2.5 The vigour, structure and age class of the tree(s) has been assessed and reflects the tree(s) at the time of the inspection. The methodology for determining vigour, structure and age class can be found within the Tree Assessment Criteria (**Appendix 6**).
- 1.2.6 Each tree has been given Useful Life Expectancy (ULE) rating. This rating defines the length of time that the arborist feels an individual tree can be retained with an acceptable level of risk based on the information available at the time of inspection. Methodology used to determine these ratings can be found within the Useful Life Expectancy description and categories (**Appendix 6**).
- 1.2.7 Each tree has been assessed against the Institute of Australian Consulting Arborists (IACA) Significance of a Tree Assessment Rating System (STARS). This provides a dual method of objectively rating the viability and retention value of urban trees on development sites. The STARS assessment criteria and retention matrix table can be found within the Tree Significance Assessment Criteria and Retention Value Matrix (**Appendix 7**)
- 1.2.8 Digital photographs were taken on the day of the inspection and can be found as Site Photographs (**Appendix 5**).

### **1.3 Trees on Development Sites**

- 1.3.1 The Australian Standard 4970-2009 Protection of Trees on Development Sites defines the requirements for assessing trees with respect to development. It provides the guidance on how to decide which trees are appropriate for retention and on the means of protecting them during construction works. It describes the areas and offsets, referred to as the Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) required to be free from development works to maintain tree vitality and stability. This report has been prepared in accordance with the conditions set out within the standard.
- 1.3.2 Tree Protection Zone – The tree protection zone is defined as a specified area above and below ground set aside for the protection of the tree’s roots and crown. It is expressed as a radial measurement taken from the centre of the trunk at ground level.

- 1.3.3 Structural Root Zone – The structural root zone is defined as a specified area around the base of a tree required to maintain its stability within the ground. It is expressed as a radial measurement taken from the centre of the trunk at ground level. Excavation and development works are not recommended within the structural root zone unless additional investigation as to root size and location is undertaken.
- 1.3.4 Tree protection zone calculations have been made in accordance with AS4970-2009 and can be found within the Tree Assessment Schedule (**Appendix 1**). Calculation of the Structural Root Zone (SRZ) has been made where required. A tree location plan showing an indicative tree protection zone for each tree can be found as **Appendix 3**.
- 1.3.5 Under AS4970 development encroachments into the tree protection zone are defined as either minor or major.
- A minor encroachment is less than 10% of the area of the TPZ and is outside of the SRZ. Where this occurs detailed root investigation works should not be required and the loss of root zone compensated for elsewhere and contiguous with the TPZ.
  - A major encroachment is greater than 10% of the area of the TPZ or is inside the SRZ. Where a major encroachment exists the project arborist must demonstrate that the tree will remain viable. The area lost should be compensated for elsewhere and contiguous with the TPZ. Major encroachments may require detailed root investigation works to be undertaken.
- 1.3.6 It should be understood that the tree protection and structural root zone are indicative and do not consider the physical constraints of a site which may influence the architecture, development and spread of a tree's root system. The establishment of tree protection zones to their fullest extent may not be possible due to environmental or site constraints. Where this occurs, their establishment is to be undertaken under the guidance of the project arborist.
- 1.3.7 A general guidance note for protecting trees on development sites has been given and can be found as **Appendix 8**. This note provides basic information regarding the protection of trees during the planning and construction phases of development. All works within a designated tree protection zone are to be undertaken under the guidance and supervision of the project arborist. The guidance note is not to be used as a site-specific tree protection plan.

## 2.0 Findings and Observations

---

### 2.1 The site

2.1.1 The site is identified as LOT 101 in DP1110110. It is a level block located at the corner of North Steyne and Pine Street. Pine Lane is located adjacent the western boundary of the site and provides the access point to the underground parking. The site consists predominantly of the residential unit building. Associated landscape is considered minor and consists of maintained garden beds along North Steyne which contain the subject trees.

2.1.2 Existing site features include:

- Multi-storey residential units
- Underground parking
- Associated landscape features

2.1.3 The site is not listed as a heritage item under Schedule 5, Environmental Heritage of the Manly Local Environment Plan 2013 (MLEP 2013) nor does it fall within a general heritage conservation area.

2.1.4 The site is not identified as containing any terrestrial biodiversity under the MLEP 2013 Terrestrial Biodiversity Map Wetlands Map Watercourse Map Sheet CL02\_005.

### 2.2 The Trees

2.2.1 Individual tree details and data captured during the on-site inspection may be found as **Appendix 1** Tree Assessment Schedule. A Tree Location Plan showing the extent of indicative protection zones can be found as **Appendix 3**.

2.2.2 A total of eleven trees were assessed as part of the development. Generally, they were found to be good health and condition consistent with their species type, age class and growing environment. All the assessed trees are located within the boundary of the property. They are protected under the conditions of the Warringah Development Control Plan Section E1 Preservation of Trees or Bushland Vegetation.

2.2.3 Tree 1 is a *Callistemon salignus* (Willow Bottlebrush) and is located on the Pine Lane frontage of the site. It is a planted specimen and has been assessed as having short useful life expectancy of five to fifteen years, low landscape significance and retention value. The tree has had significant branches removed from it to create build and road side clearances. Vehicle damage to the trunk of the tree was observed.

- 2.2.4 Trees 2, 3, 4, 5, 7, 8, 9 and 11 are *Livistona australis* (Cabbage Palm) and are located on the North Steyne frontage of the site. They are planted specimens and have been assessed as having medium useful life expectancy of fifteen to forty years, medium landscape significance and retention value.
- 2.2.5 Tree 6 *Livistona australis* (Cabbage Palm) was found to have a significant vertical crack that extends approximately 1.8m from its base up its trunk. The tree is considered to have a shortened useful life expectancy due to the crack and low retention value.
- 2.2.6 Tree 10 is a *Dypsis decaryi* (Triangle Palm) located on the North Steyne Frontage of the site. It is a planted specimen and has been assessed as having medium useful life expectancy of fifteen to forty years, medium landscape significance and retention value.

## 3.0 Impacts of the Proposed Works

---

### 3.1 General

- 3.1.1 A Development Impacts Schedule can be found as **Appendix 2**. Tree protection zones have been plotted over the ground floor plan and can be found as **Appendix 4**.
- 3.1.2 The protection zone of tree 1 is clear of the proposed development works allowing for its retention. Its protection is to be established under guidance of a project arborist during construction works to ensure its viable retention.
- 3.1.3 The demolition /Proposed Ground Floor Plan, drawing DA1003, shows the alignment of the new terrace area and stone clad wall along the North Steyne frontage of the property. Trees 2, 3, 5 and 8 are positioned within the footprint of these works and cannot be retained under the current design.
- 3.1.4 Trees 4, 7, 9 and 10 are located clear of the proposed new terrace area but incur significant encroachments into their indicative tree protection zones. However, these incursions are likely to be exaggerated due to a restricted rooting environment resulting from below ground features such as the footings of the existing front wall. In addition, the morphology and architecture of palm tree root systems differs from broad leaved and coniferous trees. Roots are initiated from the base of the trunk and do not spread out to the extent that broad leaved and coniferous trees do. As such, trees 4, 7, 9 and 10 may be retained with respects to the proposed works.

3.1.5 Although encroachments into the TPZ of tree 6 are likely to be manageable with respects to the proposed works the crack within its trunk predisposes the tree to failure under wind loading. As such, retention of the tree is not recommended.

3.1.6 Tree 11 is located within the proposed pedestrian footpath and entry adjacent the northern boundary off of North Steyne. Works associated with the footpath are to be undertaken under supervision of the project arborist to ensure impacts are minimized. Any excavation within the TPZ to obtain working levels is to be undertaken under supervision of the project arborist.

### **3.2 Trees that require removal**

3.2.1 Tree 2, 3, 5, 6 and 8 cannot be retained under the current design and shall require removal.

### **3.3 Trees that can be retained**

3.3.1 Based upon and assessment of the plans provided trees 1, 4, 7, 9 and 10 may be retained.

### **3.4 Tree pruning works**

3.4.1 Based upon the provided plans no tree pruning works were identified as part of the proposal.

## **4.0 Conclusions**

4.1 A total of eleven trees were assessed as part of the proposed development works. Of these four trees 2, 3, 5 and 8 have been identified for removal due to development impacts. Seven trees 1, 4, 6, 7, 9, 10 and 11 have been identified for retention.

4.2 Prior to the commencement of any construction works a project arborist is to be appointed. The project arborist is to advise on, monitor, inspect and ensure compliance where trees are retained within and where required adjacent to the site. Any work within a designated tree protection zone is to be supervised by the project arborist.

4.3 It is understood that the ability to establish a tree protection zone, to its fullest extent, may be difficult and impractical due to physical site restrictions and the need for a workable area. It is recommended that the protection measures are established under consultation between the property owner, building contractor and project arborist prior to works commencing on-site. Based upon on-site observations the protection of trees, 4, 6, 7, 9, 10 and 11 is likely to consist of trunk protection battens. Tree protection measures may be altered and adjusted under guidance of the project arborist as construction works progress. Where encroachments through or over a tree protection zone are required appropriate



ground protection measures are to be implemented unless otherwise stated by the project arborist. TPZ's are to be maintained throughout the construction process to ensure construction impacts are minimised.

# Appendices

**Appendix 1:** Tree Assessment Schedule

**Appendix 2:** Development Impacts Schedule

**Appendix 3:** Tree Location Plan

**Appendix 4:** TPZ encroachments

**Appendix 5:** Site Photographs

**Appendix 6:** Tree Inspection Criteria

**Appendix 7:** Significance of a Tree Assessment Rating System (STARS)

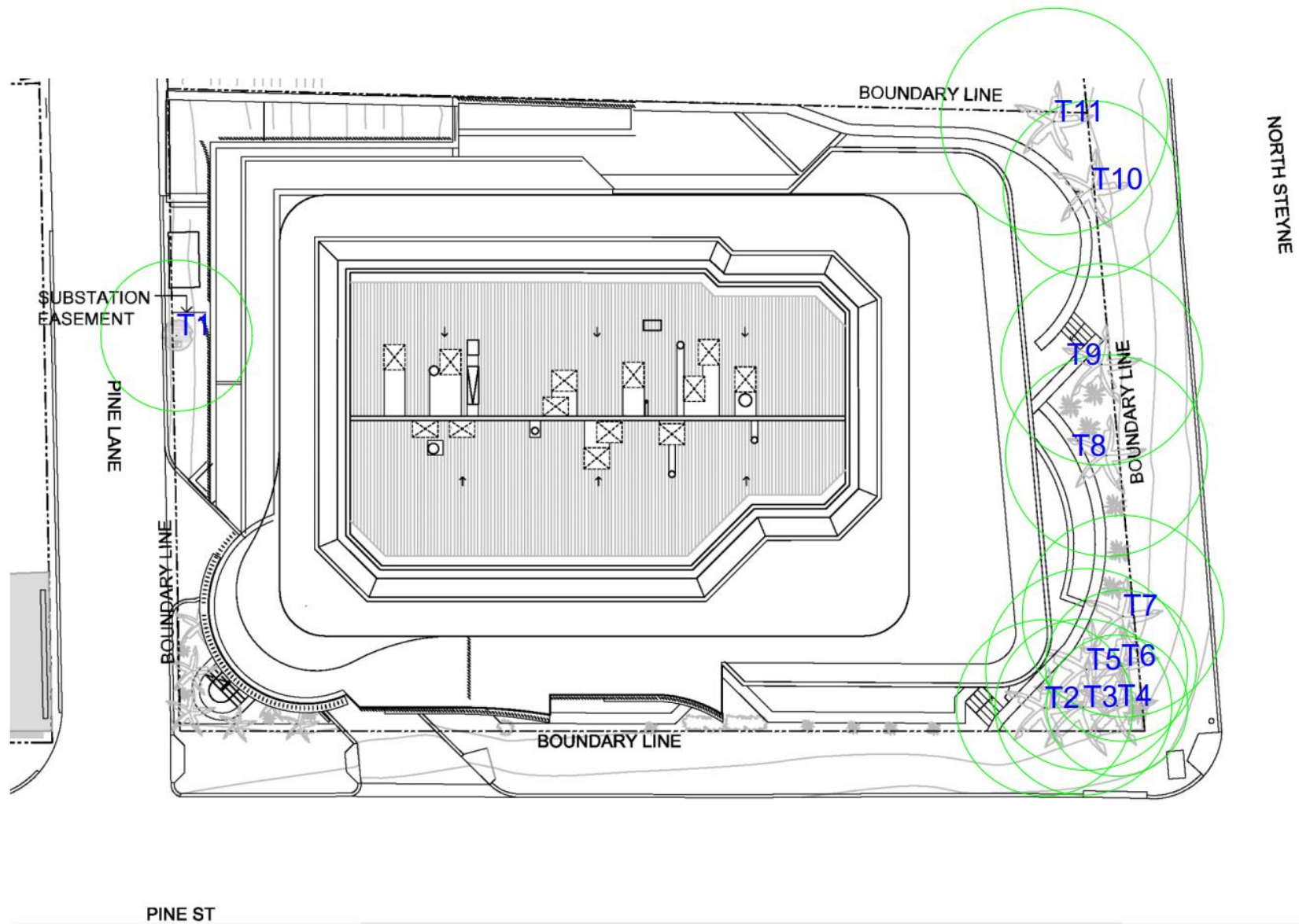
**Appendix 8:** Guidance Note for Trees on development Sites

## Appendix 1: Tree Assessment Schedule

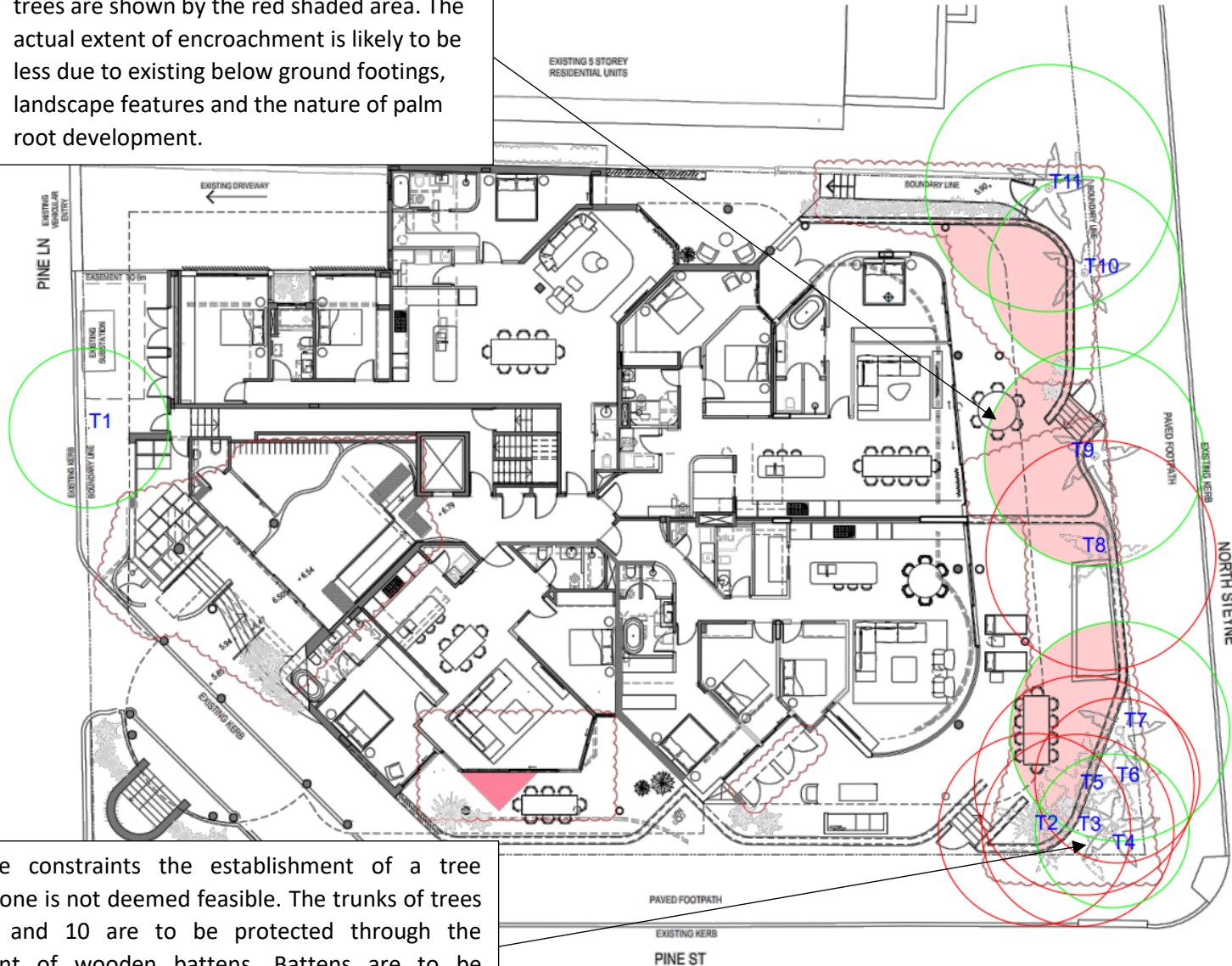
Tree No	Botanical Name Common Name	Height (m)	Canopy Spread (m)	DBH (mm)	Age Class	Vigour	Condition	ULE	Landscape Significance	Retention Value	TPZ (m)	SRZ (m)	Tree Characteristics
1	Callistemon salignus (Willow Bottlebrush)	10-15	3x3	300	M	N	G	S	L	L	3.6	2.25	Tree located adjacent Pine Lane frontage of site. Significant branches to 100mm diameter have been pruned from the tree. Damage to trunk observed. Minor dieback on outer canopy. Base of tree lifting pavers.
2	Livistona australis (Cabbage Palm)	5-10	2x2	350	M	N	G	M	M	M	4.2	2.47	Tree located adjacent North Steyne frontage of site. Recently pruned to remove dead fronds and shape crown.
3	Livistona australis (Cabbage Palm)	10-15	2x2	350	M	N	G	M	M	M	4.2	2.47	Tree located adjacent North Steyne frontage of site. Recently pruned to remove dead fronds and shape crown.
4	Livistona australis (Cabbage Palm)	5-10	2x2	280	M	N	G	M	M	M	3.36	2.13	Tree located adjacent North Steyne frontage of site. Recently pruned to remove dead fronds and shape crown.
5	Livistona australis (Cabbage Palm)	10-15	2x2	330	M	N	G	M	M	M	3.96	2.37	Tree located adjacent North Steyne frontage of site. Recently pruned to remove dead fronds and shape crown.
6	Livistona australis (Cabbage Palm)	5-10	2x2	300	M	N	G	S	M	L	3.6	2.25	Tree located adjacent North Steyne frontage of site. Recently pruned to remove dead fronds and shape crown. Vertical crack in trunk of tree to approx 1.8m
7	Livistona australis (Cabbage Palm)	10-15	2x2	400	M	N	G	M	M	M	4.8	2.47	Tree located adjacent North Steyne frontage of site. Recently pruned to remove dead fronds and shape crown.
8	Livistona australis (Cabbage Palm)	10-15	2x2	400	M	N	G	M	M	M	4.8	2.47	Tree located adjacent North Steyne frontage of site. Recently pruned to remove dead fronds and shape crown.
9	Livistona australis (Cabbage Palm)	10-15	2x2	400	M	N	G	M	M	M	4.8	2.47	Tree located adjacent North Steyne frontage of site. Recently pruned to remove dead fronds and shape crown.
10	Dyopsis decaryi (Triangle Palm)	5-10	3x3	350	M	N	G	M	M	M	4.2	2.13	Tree located adjacent North Steyne frontage of site.
11	Livistona australis (Cabbage Palm)	10-15	2x2	450	M	N	G	M	M	M	5.4	2.57	Tree located adjacent North Steyne frontage of site. Recently pruned to remove dead fronds and shape crown.

## Appendix 2: Development Impacts Schedule

Tree No	Tree name	Development Impacts	Controls	Retain or Remove Tree
1	<i>Callistemon salignus</i> (Willow Bottlebrush)	No impacts, TPZ is clear of the proposed works.	Trunk of tree is to be protected through the installation of protective battens (refer <b>Appendix 7</b> point 8). The health and condition of the tree is to be monitored throughout the construction phase of the development.	Retain
2	<i>Livistona australis</i> (Cabbage Palm)	Tree located within additional ground floor balcony/terraced area and cannot be retained under the current design.	Nil	Remove
3	<i>Livistona australis</i> (Cabbage Palm)	Tree located within additional ground floor balcony/terraced area and cannot be retained under the current design.	Nil	Remove
4	<i>Livistona australis</i> (Cabbage Palm)	New balcony/terraced area poses an indicative encroachment of 18% into the TPZ.	Trunk of tree is to be protected through the installation of protective battens (refer <b>Appendix 7</b> point 8). The health and condition of the tree is to be monitored throughout the construction phase of the development. All works within the TPZ to be supervised by the project arborist.	Retain
5	<i>Livistona australis</i> (Cabbage Palm)	Tree located within additional ground floor balcony/terraced area and cannot be retained under the current design.	Nil	Remove
6	<i>Livistona australis</i> (Cabbage Palm)	Removal of the existing wall balcony/terraced area constitutes an indicative encroachment of 12% into the TPZ. However, given the nature of palm root development it is likely that the existing wall footings have restricted the growth and development of roots reducing the extent of the encroachment. New balcony/terraced area poses an indicative encroachment of 32% into the TPZ.	Nil	Remove
7	<i>Livistona australis</i> (Cabbage Palm)	Removal of the existing wall balcony/terraced area constitutes an indicative encroachment of 27% into the TPZ. However, given the nature of palm root development it is likely that the existing wall footings have restricted the growth and development of roots reducing the extent of the encroachment. New balcony/terraced area poses an indicative encroachment of 43% into the TPZ.	Trunk of tree is to be protected through the installation of protective battens (refer <b>Appendix 7</b> point 8). The health and condition of the tree is to be monitored throughout the construction phase of the development. Removal of existing built features within the TPZ to be undertaken in accordance with <b>Appendix 7</b> point 15. All works within the TPZ to be supervised by the project arborist.	Retain
8	<i>Livistona australis</i> (Cabbage Palm)	Tree located within additional ground floor balcony/terraced area and cannot be retained under the current design.	Nil	Remove
9	<i>Livistona australis</i> (Cabbage Palm)	Removal of the existing wall balcony/terraced area constitutes an indicative encroachment of 37% into the TPZ. However, given the nature of palm root development it is likely that the existing wall footings have restricted the growth and development of roots reducing the extent of the encroachment. New balcony/terraced area poses an indicative encroachment of 49% into the TPZ.	Trunk of tree is to be protected through the installation of protective battens (refer <b>Appendix 7</b> point 8). The health and condition of the tree is to be monitored throughout the construction phase of the development. Removal of existing built features within the TPZ to be undertaken in accordance with <b>Appendix 7</b> point 15. All works within the TPZ to be supervised by the project arborist.	Retain
10	<i>Dypsis decaryi</i> (Triangle Palm)	Removal of the existing wall balcony/terraced area constitutes an indicative encroachment of 36% into the TPZ. However, given the nature of palm root development it is likely that the existing wall footings have restricted the growth and development of roots reducing the extent of the encroachment. New balcony/terraced area poses an indicative encroachment of 34% into the TPZ.	Trunk of tree is to be protected through the installation of protective battens (refer <b>Appendix 7</b> point 8). The health and condition of the tree is to be monitored throughout the construction phase of the development. Removal of existing built features within the TPZ to be undertaken in accordance with <b>Appendix 7</b> point 15. All works within the TPZ to be supervised by the project arborist.	Retain
11	<i>Livistona australis</i> (Cabbage Palm)	Tree located within footprint of new entry point adjacent northern boundary off North Steyne. Removal of the existing wall balcony/terraced area constitutes an indicative encroachment of 23% into the TPZ. However, given the nature of palm root development it is likely that the existing wall footings have restricted the growth and development of roots reducing the extent of the encroachment. New balcony/terraced area poses an indicative encroachment of 21% into the TPZ. Low free standing wall adjacent base of tree to be removed for new pedestrian access.	Trunk of tree is to be protected through the installation of protective battens (refer <b>Appendix 7</b> point 8). The health and condition of the tree is to be monitored throughout the construction phase of the development. Removal of existing built features within the TPZ to be undertaken in accordance with <b>Appendix 7</b> point 15. All works within the TPZ to be supervised by the project arborist.	Retain



Indicative TPZ encroachments for retained trees are shown by the red shaded area. The actual extent of encroachment is likely to be less due to existing below ground footings, landscape features and the nature of palm root development.



Due to site constraints the establishment of a tree protection zone is not deemed feasible. The trunks of trees 1, 4, 7, 9 and 10 are to be protected through the establishment of wooden battens. Battens are to be installed in accordance with **Appendix 7** point 8 under guidance of the project arborist.

Extract from Demolition Proposed Ground Floor Plan, drawing DA1003 showing trees to be removed and retained. Trees indicated by green circles are to be retained, trees indicated by red circles are to be removed. TPZ's have been calculated in accordance with AS4970-2009 Protection of Trees on Development sites.

DRAWN	OT
DATE	13/07/2021
SCALE	1:200 @ A 2

TITLE/DWG NO.

**Appendix 4: TPZ encroachments**



## Appendix 5: Site Photographs

**Photograph 1:** Tree 1 *Callistemon salignus* (Willow Bottlebrush) located within Pine Lane.



**Photograph 2:** Trees 2, 3, 4, 5, 6 and 7 *Livistona australis* (Cabbage Palms) located at the corner of Pine Street and North Steyne.



**Photograph 3:** Trees 8 and 9 *Livistona australis* (Cabbage Palms) located along the North Steyne frontage of the site.



**Photograph 4:** Tree 10 *Dypsis decaryi* (Triangle Palm) and tree 11 *Livistona australis* (Cabbage Palms) located along the North Steyne frontage of the site.



## Appendix 6: Tree Inspection Criteria.

**Tree number:** Identifying number given to individual (or group of) trees.

**Botanical Name:** Latin name for tree showing genus and species.

**Common Name:** The common name given to the tree.

**Tree Dimensions:** The physical dimensions of the tree.

- **Height:** Estimated or measured height of tree in meters.
- **Spread:** Estimated or measured radial canopy spread of tree in meters.
- **Diameter at Breast Height (DBH):** The estimated or measured diameter of trunk in given in millimetres measured at 1.4m from ground.

**Age Class:** An estimation of how old the tree is in relation to its life expectancy.

- **Young** – Age less than 20% of life expectancy of tree in situ
- **Mature** – Age 20% - 80% of life expectancy of tree in situ
- **Old** – Age greater than 80% of life expectancy of tree in situ
- **Dead** – Tree is dead

**Vigour:** Ability of a tree to sustain its life processes. This is independent of the condition of a tree but may impact upon it. Vigour can appear to alter rapidly with change of seasons (seasonality) e.g., dormant, deciduous or semi-deciduous trees. Vigour can be categorised as Dormant, Low, Normal and High.

- **Dormant Vigour** – Determined by the existing turgidity in the lower order branches in the outer extremity of the crown, with good bud set and formation, and where the last extension growth is distinct from those most recently preceding it, evident by bud scale scars. Normal vigour during dormancy is achieved when such growth is evident on a majority of branches throughout the crown.
- **Low Vigour** – Reduced ability of a tree to sustain its life processes. This may be evident by the atypical growth of leaves, reduced crown cover and reduced crown density, branches, roots and trunk, and a deterioration of their functions with reduced resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **Normal Vigour** – Ability of a tree to maintain and sustain its life processes. This may be evident by the typical growth of leaves, crown cover and crown density, branches, roots and trunk and resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **High Vigour** – Accelerated growth of a tree due to incidental or deliberate artificial changes to its growing environment that are seemingly beneficial, but may result in premature aging or failure if the favourable conditions cease, or promote prolonged senescence if the favourable conditions remain, e.g. water from a leaking pipe, water and nutrients from a leaking or disrupted sewer pipe, nutrients from animal waste, a tree growing next to a chicken coop, or a stock feed lot, or a regularly used stockyard, a tree subject to stringent watering and fertilisation program, or some trees may achieve an extended lifespan from continuous pollarding practices over the life of the tree.

**Condition:** A tree's crown form and growth habit, as modified by its environment (aspect, suppression by other trees, soils) the stability and viability of the root plate, trunk and structural branches (first (1<sup>st</sup>) and possibly (2<sup>nd</sup>) order branches), including structural defects such as wounds, cavities or hollows, crooked trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with vigour and it is possible for a tree to be of normal vigour but in poor condition. Condition can be categorised as Dead, Poor, Fair and Good.

- **Dead Condition** – Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms; Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves), Osmosis (the ability of the roots system to take up water), Turgidity (the ability of the plant to sustain moisture pressure in its cells), Epicormic shoots or epicormic strands in Eucalypts (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a lignotuber), Permanent leaf loss, Permanent leaf wilting (the loss of turgidity which is marked by desiccation of stems leaves and roots), Abscission of the epidermis (bark desiccates and peels off to the beginning of the sap wood).
- **Poor Condition** - Tree is of good habit or misshapen, a form that may be severely restricted for space and light, exhibits symptoms of advanced and irreversible decline such as fungal, or bacterial infestation, major die-back in the branch and foliage crown, structural deterioration from insect damage e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local environment that would normally be sufficient to provide for its basic survival if in good to fair condition. Deterioration physically, often characterised by a gradual and continuous reduction in vigour but may be independent of a change in vigour, but characterised by a proportionate increase in susceptibility to, and predation



by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent from, or contributed to by vigour.

- **Fair Condition** - Tree is of good habit or misshapen, a form not severely restricted for space and light, has some physical indication of decline due to the early effects of predation by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the environment essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from, or contributed to by vigour.
- **Good Condition** - Tree is of good habit, with crown form not severely restricted for space and light, physically free from the adverse effects of predation by pests and diseases, obvious instability or structural weaknesses, fungal, bacterial or insect infestation and is expected to continue to live in much the same condition as at the time of inspection provided conditions around it for its basic survival do not alter greatly. This may be independent from, or contributed to by vigour.

**Useful Life Expectancy (ULE):** is the length of time that the arborist assesses an individual tree can be retained with an acceptable level of risk based on the information available at the time of inspection. It is a snapshot in time of the potential an individual tree has for survival in the eyes of the assessor. ULE is not static – it is closely related to tree health and the surrounding conditions. Alterations in these variables may result in changes to the ULE assessment. Consequently, the reliability all ULE assessments have will decrease as time passes from the initial assessment and the potential for changes in variables increases. ULE is categorised as Long, Medium, Short, Remove and Young or Small.

- **Long (L):** Trees that appear to be retainable at the time of the assessment for more than 40 years with an acceptable level of risk.
- **Medium (M):** Trees that appear to be retainable at the time of the assessment for 15-40 years with an acceptable level of risk.
- **Short (S):** Trees that appear to be retainable at the time of the assessment for 5-15 years with an acceptable level of risk.
- **Remove (R):** Trees that should be removed within the next 5 years.
- **Young or Small Trees (Y):** Trees that can be reliably moved or replaced.

## Appendix 7: Tree Significance Assessment Criteria & Retention Value Matrix

### IACA Significance of a Tree, Assessment Rating System (STARS) © (IACA 2010) ©

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd in June 2010.

The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. However, rating the significance of a tree becomes subjective and difficult to ascertain in a consistent and repetitive fashion due to assessor bias. It is therefore necessary to have a rating system utilising structured quantitative criteria to assist in determining the retention value for a tree. To assist this process all definitions for terms used in the *Tree significance – Assessment Criteria* and *Tree Retention Value – Priority Matrix*, are taken from the IACA Dictionary for Managing Trees in Urban Environments 2009.

This rating system will assist in the planning processes for proposed works, above and below ground where trees are to be retained on or adjacent a development site. The system uses a scale of High, Medium and Low significance in the landscape. Once the landscape significance of an individual tree has been defined, the retention value can be determined.

### Tree Significance – Assessment Criteria

#### 1. High significance in landscape

- The tree is in good condition and good vigour
- The tree has a form typical for the species
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age
- The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on council's significant tree register
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions

#### 2. Medium significance in landscape

- The tree is in fair-good condition and good or low vigour
- The tree has form typical or atypical of the species
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street
- The tree provides a fair contribution to the visual character and amenity of the local area
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ

#### 3. Low significance in landscape

- The tree is in fair-poor condition and good or low vigour
- The tree has form atypical of the species
- The tree is not visible or is partly visible from the surrounding properties as obstructed by other vegetation or buildings
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area
- The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms
- The tree has a wound or defect that has the potential to become structurally unsound
- Environmental Pest / Noxious Weed Species
- The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties.
- The tree is a declared noxious weed by legislation
- Hazardous / Irreversible Decline
- The tree is structurally unsound and/or unstable and is considered potentially dangerous
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or in part in the immediate to short term

**The tree is to have a minimum of three (3) criteria in a category to be classified in that group.**

**Note:** The assessment criteria are for individual trees only, however, can be applied to a monoculture stand in its entirety e.g. hedge.

**Table 1.0 Tree Retention Value – Priority Matrix**

	Tree Significance					
		1. High	2. Medium	3. Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape		
Useful Life Expectancy					Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
	Long >40 years					
	Medium 15-40 years					
	Short <1-15 years					
	Dead or Young & Small					

### Legend for Matrix Assessment

	<b>Priority for retention (High):</b> These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 <i>Protection of trees on development sites</i> . Tree sensitive construction measures must be implemented e.g., pier and beam etc if works are to proceed within the Tree Protection Zone.
	<b>Consider for retention (Medium):</b> These trees may be retained and protected. These are considered less critical; however, their retention should remain priority with the removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
	<b>Consider for removal (Low):</b> These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
	<b>Remove (R):</b> These trees are considered hazardous, in irreversible decline or weeds and should be removed irrespective of development.

### References

Australia ICOMOS Inc. 1999, The Burra Charter – The Australian OCOMOS Charter for Places of Cultural Significance, International Council of Monuments and Sites, [www.icomos.org/australia](http://www.icomos.org/australia)  
 Draper BD and Richards PA 2009, Dictionary For Managing Trees in Urban Environments, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood Victoria, Australia.  
 Footprint Green Pty Ltd 2001, Footprint Green Tree Significance & Retention Value Matrix, Avalon, NSW Australia, [www.footprintgreen.com.au](http://www.footprintgreen.com.au)

## **Appendix 8: General Guidance Note for Trees on Development Sites.**

### **1.0 Purpose of this guidance note**

---

- 1.1 This guidance note details the basic general requirements that must be followed when trees are retained on and in some cases adjacent to development sites. The tree protection requirements are determined by the tree species, the existing physical constraints of the growing environment both above and below ground and the development proposal itself.
- 1.2 This guidance note should always be used in conjunction with the tree assessment information specific for the particular site.
- 1.3 This guidance note is not to be used as a site-specific tree protection plan. Its aim is to provide site personnel with a basic understanding of the requirements needed to successfully protect and maintain trees whilst development works are undertaken. All personnel working adjacent to or within tree protection zones must be properly briefed about their responsibilities towards the trees and their retention.
- 1.4 This guidance note is based on the Australian Standard AS4970 – 2009 *Protection of Trees on Development Sites* and AS 4373 – 2007 *Pruning of Amenity Trees*.

### **2.0 Site Personnel**

---

- 2.1 All site personnel including contractors are to be made aware of the relevant tree protection requirements and the role of tree protection zones on the site.

### **3.0 The project arborist**

---

- 3.1 A project arborist shall be engaged prior to any works commencing on the site. The project arborist shall have a minimum qualification of the Australian Qualifications Framework (AQF) level 5 in Arboriculture.
- 3.2 The project arborist is to advise on, monitor, inspect and ensure compliance where trees are retained within and where required adjacent to the development site.
- 3.3 Any work within a designated tree protection zone requires authorisation from the project arborist.

### **4.0 Tree and vegetation removal and pruning**

---

- 4.1 Trees and vegetation approved for removal by the relevant consent authority shall be undertaken prior to any other works commencing on site, including the establishment of tree protection zones.
- 4.2 All tree removal works are to be undertaken by suitably qualified tree workers (minimum AQF level 2) and in accordance with the NSW Workcover Code of Practice for the Amenity Tree Industry 1998.
- 4.3 In addition, all tree pruning works (including roots) are to be undertaken in accordance with the Australian Standard AS4373-2007 *Pruning of Amenity Trees*.
- 4.4 All care shall be taken to avoid damaging trees identified for retention during removal and pruning works.

## **5.0 Tree Protection Zone (TPZ)**

---

- 5.1 The tree protection zone is the designated area around a tree to protect the trunk, roots and crown during development works.
- 5.2 Tree protection fencing is to be installed in compliance with Section 4 of the Australian Standard AS4970-2009 *Protection of Trees on Development Sites*.
- 5.3 The following activities unless otherwise authorised by the project arborist are restricted within the tree protection zone:
- Machine excavation including trenching
  - Excavation for silt/sediment fencing
  - Cultivation
  - Storage
  - Preparation of chemicals, including preparation of cement products
  - The parking of vehicle and/or plant
  - Refuelling
  - Dumping of waste
  - Washing down and cleaning of equipment
  - Placement of fill
  - Lighting of fires
  - Soil level changes
  - Temporary or permanent installation of utilities and signs
  - Physical damage to the trees
- 5.4 Any work within a designated tree protection zone requires authorisation from the project arborist.

## **6.0 Signage**

---

- 6.1 Signs identifying the TPZ shall be attached to the tree protection fencing and clearly visible from within the development site. The contact details of either the site manager or project arborist shall be displayed on the sign.
- 6.2 Further reference to the Australian Standard AS4970-2009 *Protection of Trees on Development Sites* should be made regarding signage.

## **7.0 Tree protection fencing**

---

- 7.1 Tree protection fencing is to be installed at the limits of the TPZ or as determined by the project arborist. Fencing shall consist of 1.8m high interlocking chain link or plywood fencing panels. The fencing shall be erected in such a way as to prevent building materials, soil and unauthorised personnel entering the TPZ. Refer to the diagrams at the end of this note.

## **8.0 Trunk and branch protection**

---

- 8.1 Where necessary trunk protection may be required. Trunk protection is installed by first wrapping the stem of the tree in hessian or like material then strapping timber battens over the top. It is recommended that timber battens with the dimensions of length 2000mm,

width 75mm and depth 50mm are used. The battens are not to be directly screwed or nailed into the tree. Refer to the diagrams at the end of this note.

- 8.2 Where necessary branch protection may be required. Branch protection is installed in the same fashion as the trunk protection mentioned above but cut to suit the shape of the branch. Refer to the diagrams at the end of this note.
- 8.3 Reference to Section 4.5.2 of the Australian Standard AS4970-2009 *Protection of Trees on Development Sites* should be made for further details.

## **9.0 Ground protection**

---

- 9.1 Where temporary access or encroachment into the TPZ is required ground protection measures are to be implemented. The purpose of ground protection measures is to avoid damage to tree roots and compaction of the soils within the TPZ. Refer to the diagrams at the end of this note.
- 9.2 Ground protection generally consists of 100mm deep layer of mulch overlaid with rumble boards or road plates (light traffic). Where heavy traffic through or over the TPZ is required, the existing ground is to be protected by a geo-textile fabric covered with a 300mm layer of compacted road base or railway ballast.
- 9.3 Reference to Section 4.5.3 of the Australian Standard AS4970-2009 *Protection of Trees on Development Sites* should be made for further details.

## **10.0 Excavation within the TPZ**

---

- 10.1 Excavations within the TPZ may only be undertaken under the supervision and authorisation of the site arborist.
- 10.2 All excavation within the tree protection zone must be carried out carefully using spades, forks, and trowels, taking care not to damage the bark and wood of any roots. Specialist tools for removing soil around roots using compressed air may be an appropriate alternative to hand digging, if available. All soil removal must be undertaken with care to minimise disturbance of roots beyond the immediate area of the excavation. Where possible, flexible clumps of smaller roots, including fibrous roots, should be retained if they can be displaced temporarily or permanently beyond the excavation without damage. If digging by hand, a fork should be used to loosen the soil and help locate any substantial roots. Once roots have been located, the trowel should be used to clear the soil away from them without damaging the bark.
- 10.3 Roots temporarily exposed must be protected from direct sunlight, drying out and extremes of temperature by appropriate covering.

## **11.0 Fill within the TPZ**

---

- 11.1 Where possible soil levels are not to be raised within the TPZ. Retaining walls and alternate engineering solutions are to be considered to avoid over battering and encroachment into the TPZ.
- 11.2 Where fill is required within the TPZ it is to be of an approved courser material than the existing site soil and allow for free gaseous and water exchange into the natural soil profile.

## **12.0 Pier and beam footings within the TPZ**

---

- 12.1 Where footings are required within the TPZ they are to be of pier and beam type construction. Excavation shall be restricted to pier/post holes only. All other footing and foundation parts shall be constructed and installed above the existing ground level.
- 12.2 Pier locations within the TPZ are to be excavated using non-destructive techniques and where possible to their full extent. Where this is not achievable a minimum depth of 600mm shall be excavated. Any further excavation that is then to be undertaken mechanically is to be of a diameter less than that excavated by hand whilst avoiding compaction of the soils within the TPZ.
- 12.3 A degree of flexibility should be built into the design to allow for the pier locations to be moved if structural or significant roots are found. A minimum clearance distance of 100mm shall be allowed around significant roots.

## **13.0 Scaffolding**

---

- 13.1 Where possible scaffolding shall not be erected or installed within the TPZ nor come into contact with any part of a tree scheduled for retention and protection.
- 13.2 Where scaffolding is required within the TPZ suitable ground protection measures are to be implemented. Flexible branches shall be temporarily tied back to avoid the need for unnecessary pruning or potential tree damage. Refer to the diagrams at the end of this note.
- 13.3 Further reference to section 4.5.6 of the Australian Standard AS4970-2009 *Protection of Trees on Development Sites* should be made for further details.

## **14.0 Damage to Trees**

---

- 14.1 Damage to any part of the tree including roots, bark, trunk, branches and leaf material shall be avoided.
- 14.2 Damage to trees may also be incurred by contamination of the TPZ through chemical, paint or cement wash out.
- 14.3 The ripping and tearing of roots by excavators or shovels will cause damage and potentially impact tree health. Where roots are accidentally damaged during the works they are to be exposed back to intact woody tissue and pruned in accordance with the arborist's recommendations.
- 14.4 Any damage to any part of a retained tree is to be reported to the project arborist immediately.

## **15.0 Demolition of structures and surfaces within the TPZ**

---

- 15.1 The demolition of existing structures and surfaces within the TPZ is to be supervised by the project arborist.
- 15.2 Where possible existing structures are to be dismantled manually using hand tools. Demolition works should start closest to the tree and work backwards moving out of the TPZ avoiding damage or compaction to the soil. Heavy machinery such as excavators should not be used within the TPZ unless they can be positioned on and work from existing hard surfaces such as concrete slabs.

- 15.3 Tree roots exposed by the demolition of existing site structures are to be kept in place and advice sought from the project arborist.

#### **16.0 Soft landscaping within the TPZ**

---

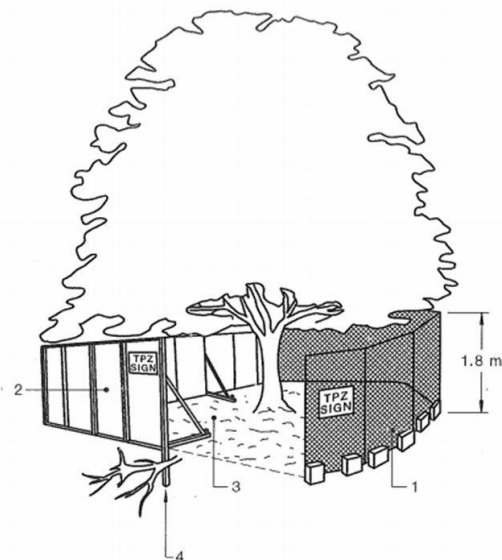
- 16.1 Soft landscaping works are regarded as the installation of plants or organic ground covers (mulch). New tree plantings requiring excavation should refer to section 10.0 *Excavation within the TPZ*. Hard landscaping features such as retaining walls, edging and footpaths are regarded as construction works.
- 16.2 Where possible trees to be retained shall be incorporated into the landscape design.
- 16.3 Where fill is required for planting it is to be of an approved courser grade than the site soils and comply with section 11.2.

#### **17.0 Utilities and services within the TPZ**

---

- 17.1 Where possible the installation of utilities and services are to be kept out of the TPZ.
- 17.2 Where this is not deemed possible trenchless or underground boring techniques are to be employed. Underground boring should be no less than 600mm below the existing soil level.
- 17.3 Suspension of service wires through the TPZ should be kept clear of the trees canopy and regulatory safety clearances observed.



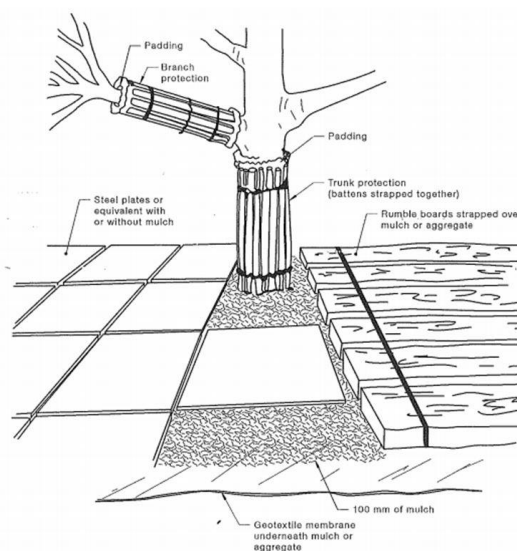


Tree Protection Fencing

Tree protection fencing shall comprise of interlocking wire mesh, plywood or wooden paling fence panels. The fence must be rigid and no less than 1.8m in height. AS 4687 specifies applicable fencing requirements. Shade cloth or similar should be attached to reduce the transport of dust, other particulate matter and liquids into the protected area.

Legend:

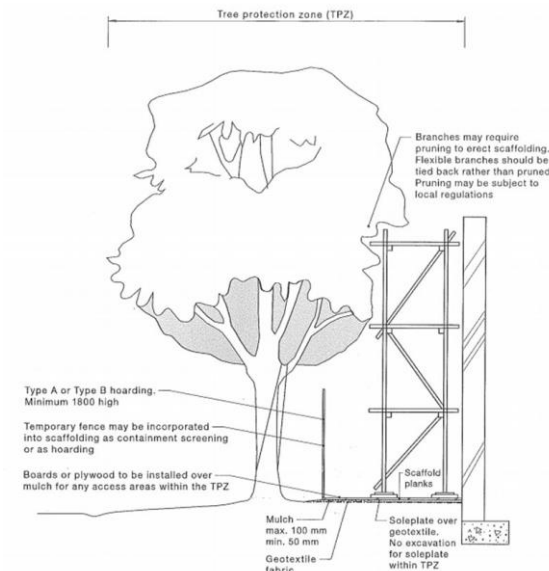
1. Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2. Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3. Mulch installation across surface of TPZ (at the discretion of the arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
4. Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.



Trunk, Branch & Ground Protection

Trunk and branch protection shall be installed as shown in the attached diagram. The materials and positioning of protection are to be specified by the project arborist. A minimum height of 2m is recommended. Do not drive nails into the trunks or branches.

If temporary access for machinery is required within the TPZ ground protection measures will be required. Measures may include a permeable membrane such as geotextile fabric beneath a layer of mulch or crushed rock below rumble boards.



Erection of Scaffolding within the TPZ

Where scaffolding is required, it should be erected outside the TPZ. Where it is essential for scaffolding to be erected within the TPZ, branch removal should be minimised. The ground below the scaffolding should be protected by boarding as shown in the adjacent figure.