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7th September 2021

Attention: Clare Collett

Re – Arborist Supplementary Report – Nepean Business Park.

Reference is made to the recent request for additional Arboricultural information in regards to trees within the proposed redevelopment of the Employment Lands site at Penrith Lakes. Trees surveyed for this report are the trees located within the property adjoining Old Castlereagh Road Penrith.

The original survey was undertaken in September 2019 – refer Arboricultural report ATC 19-123. This survey assessed the health, structure and life expectancy of trees within the site. Tree Protection Zones (TPZ) and Structural Root Zones (SRZ) were also calculated for each tree for the required setbacks needed if the trees were to be retained within the redevelopment of the site.

Australian Tree Consultants Pty Ltd recently received directions to provide this supplementary Arborist report to reply to the concerns raised in the Statement of Facts and contentions in regards to the planted trees along Old Castlereagh Rd Penrith. Contention 4 has been reviewed and the following is Australian Tree Consultants recommendations in regards to these trees.

The following report will address these concerns and also include the requirement for tree removals at the western end of Old Castlereagh Rd Penrith to allow for site access.

If you require any further information in relation to this report, please contact us on 0418 474 796.

Yours sincerely

Hugh Taylor

Director - Australian Tree Consultants
Member Arboriculture Australia
Diploma Horticulture – Arboriculture (Level 5)
Arborist/ Tree Surgeon/ Horticulturist
Certificate IV Occupational Health & Safety
QTRA No 2650

Southern Wetlands Site
Nepean Business Park
Castlereagh Rd.

Supplementary Report



7th September 2021

AUSTRALIAN TREE CONSULTANTS PTY LTD

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INTRODUCTION

In September 2019 Australian Tree Consultants Pty Ltd was commissioned by Great River NSW Pty Ltd to conduct a Tree Survey of trees within Penrith Lakes Employment Land. The trees inspected for this report (ATC 19-123) are on the northern side of the site adjoining Old Castlereagh Rd Penrith.

Additional Arboricultural information has been requested – refer Statement of Facts and Contentions in Land and Environment Court proceedings 2021/00204069. The following supplementary report will address these concerns and also include the requirement for tree removals at the western end of Old Castlereagh Rd Penrith and tree protection measures during construction.

This supplementary report should be read in conjunction with the initial Arboricultural report as listed above.

Background – Arboricultural Report 2019

The site was initially inspected by Hugh Taylor AQF Level 5 Consulting Arborist and Thomas Taylor Environmental Scientist in September 2019.

The aim was to provide an assessment of the health, structure and life expectancy of trees included in the survey and make recommendations for trees that require removal and trees that can be retained.

A Visual Tree Assessment (VTA) inspection was undertaken from ground level. Tree height, canopy spread and trunk diameter at breast height (DBH) and at base (DAB) were estimated. Data collected included species, height, canopy spread, DBH, DAB, health, structure, age, total life expectancy, % of deadwood and tree defects.

Tree Protection Zones (TPZ) and Structural Root Zones (SRZ) were also calculated for each tree for the required setbacks needed if the trees are to be retained within the redevelopment of the site.

Tree locations were obtained by the use of our GEO 7X GNSS sub cm survey system. Co-ordinates are in GDA map zone 56.

In total 494 trees were assessed. Almost two thirds (64%) of the trees were recommended for removal due to structural defects and declining health (317 trees).

DISCUSSION

Australian Tree Consultants Pty Ltd recently received directions to provide a supplementary Arborist report to reply to the concerns raised in the Statement of Facts and Contentions in regards to the planted trees along Old Castlereagh Rd Penrith. Contention 4 and contention 5.1 has been reviewed and the following is Australian Tree Consultants recommendations in regards to these trees.

The trees appear to have been planted in the 1970's and 1980's to act as a screen planting for the past mine site. Unfortunately, the trees that were planted were not to a high quality and many of the trees have structural defects that have now compromised retention.

In our initial Arboricultural report, 494 trees were assessed. Of these trees, 45% were in poor health (221 trees) and 21 trees were dead. The high number of poor trees is a result of poor past planting and tree selection as well as lopping of the trees for the powerline clearances.

A review of the trees was undertaken by Australian Tree Consultants Pty Ltd on 7th September 2021. The trees have now been allocated a retention value calculated in accordance with the IACA Significance of a Tree (STARS) system of assessment as a combination of landscape significance and estimated life expectancy. Retention values are expressed as High, Medium, Low or Very Low. This information is contained in the attached file Southern Wetlands Site A.

The STARS assessment found that only 26 trees were recorded as being of high retention value, 171 trees were recorded as medium retention value, 55 trees were recorded as low retention value and 242 trees were recorded as very low retention value.

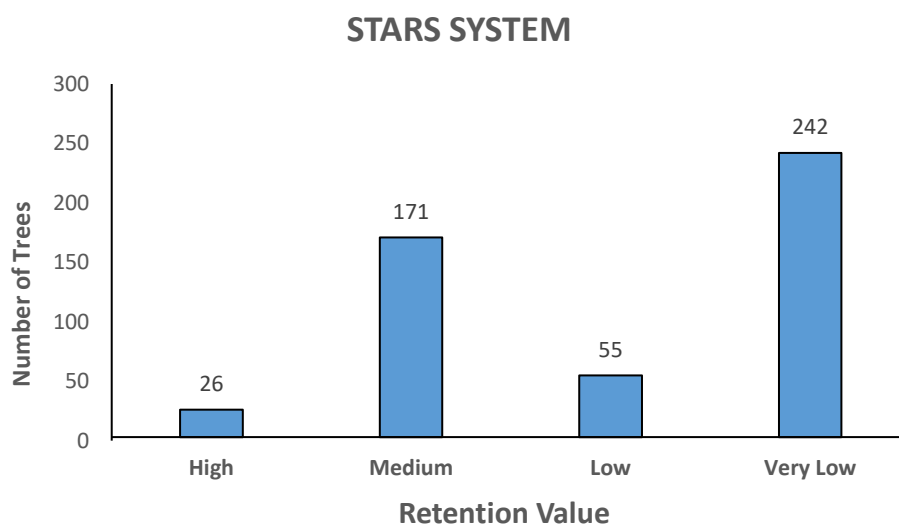


Figure 1: Retention Value of trees

Road 3.

On the western end of Old Castlereagh Rd near to the proposed road 3, twenty-nine (29) trees are required to be removed for the construction works. This information on the tree removals was obtained from the supplied plan by Enspire Nepean Business Park Tree Removal Plan 200044-DA-CO2.01 08/09/2021 Sheet 1 and 2.

The above tree removals required for the construction works ten (10) trees have fair health but of those ten (10) trees five (5) have poor structure. Nineteen (19) of the trees are in poor health.

The STARS assessment found that of the trees to be removed, no trees were recorded as being of high retention value, five (5) trees were recorded as medium retention value, five (5) trees were recorded as low retention value and nineteen (19) trees were recorded as very low retention value. Accordingly, the proposal only removes five (5) trees that are considered worthy of retention. (Trees 463 464 485 486 487) These trees are located at the junction of road 3 and Old Castlereagh Rd.

Batter along Old Castlereagh Road

At the central and Eastern end of Old Castlereagh Rd, three (3) trees No 278, 291, and 307 that are required to be removed for the proposed development. This information on the tree removals was obtained from the supplied plan by Enspire Nepean Business Park Tree Removal Plan 200044-DA-CO2.01 08/09/2021 Sheet 1 and 2 enclosed (Appendix 1). These three (3) trees are affected adversely by the proposed new batter.

The above three (3) trees removals required for the construction works two (2) trees (278 291) have good health but tree No 307 has fair health only.

The STARS assessment found that of the trees to be removed, no trees were recorded as being of high retention value, all of the three (3) trees were recorded as medium retention value.

There are approximately thirty-two (32) trees where the fill batter will raise the soils in and around the TPZ. The raising of soil levels has the potential to impact upon trees by reducing the trees access to water and nutrients and limiting the opportunity for gaseous exchange.

With onsite supervision by the project Arborist it will most likely be possible to reduce the trees requiring possible removal by the placement of the TPZ fencing and site measurement of impact of the batter.

The following table details the potential trees that may be affected by the batter and may require the project Arborist to recommend their removal.

Tree No.	Species	Common Name	Health	Structure	Retention Value STARS
1	<i>Eucalyptus tereticornis</i>	Forest Red Gum	Fair	Poor	Low
2	<i>Eucalyptus tereticornis</i>	Forest Red Gum	Poor	Poor	Very Low
3	<i>Eucalyptus tereticornis</i>	Forest Red Gum	Poor	Poor	Very Low
16	<i>Eucalyptus tereticornis</i>	Forest Red Gum	Fair	Poor	Low
50	<i>Eucalyptus tereticornis</i>	Forest Red Gum	Poor	Poor	Very Low
157	<i>Eucalyptus tereticornis</i>	Forest Red Gum	Fair	Poor	Low
161	<i>Eucalyptus tereticornis</i>	Forest Red Gum	Poor	Poor	Very Low
164	<i>Eucalyptus tereticornis</i>	Forest Red Gum	Fair	Poor	Low
165	<i>Melaleuca styphelioides</i>	Prickly-leaved Paperbark	Fair	Fair	Medium
166	<i>Melaleuca armillaris</i>	Bracelet Honey Myrtle	Fair	Fair	Medium
167	<i>Eucalyptus tereticornis</i>	Forest Red Gum	Fair	Poor	Low
212	<i>Eucalyptus tereticornis</i>	Forest Red Gum	Fair	Poor	Low
213	<i>Melaleuca styphelioides</i>	Prickly-leaved Paperbark	Fair	Fair	Medium
217	<i>Melaleuca styphelioides</i>	Prickly-leaved Paperbark	Fair	Fair	Medium
218	<i>Melaleuca styphelioides</i>	Prickly-leaved Paperbark	Poor	Hazard	Very Low
284	<i>Casuarina glauca</i>	Swamp she-oak	Good	Good	High
288	<i>Casuarina glauca</i>	Swamp she-oak	Poor	Poor	Very Low
289	<i>Casuarina glauca</i>	Swamp she-oak	Fair	Fair	Medium
293	<i>Casuarina glauca</i>	Swamp she-oak	Poor	Poor	Very Low
294	<i>Casuarina glauca</i>	Swamp she-oak	Fair	Fair	Medium
298	<i>Casuarina glauca</i>	Swamp she-oak	Fair	Fair	Medium
378	<i>Casuarina glauca</i>	Swamp she-oak	Poor	Poor	Very Low
384	<i>Casuarina glauca</i>	Swamp she-oak	Fair	Fair	Medium
386	<i>Casuarina glauca</i>	Swamp she-oak	Poor	Poor	Very Low
420	<i>Casuarina glauca</i>	Swamp she-oak	Fair	Fair	Medium
431	<i>Casuarina glauca</i>	Swamp she-oak	Fair	Fair	Medium
446	<i>Casuarina glauca</i>	Swamp she-oak	Poor	Poor	Very Low
488	<i>Casuarina glauca</i>	Swamp she-oak	Fair	Poor	Low
489	<i>Casuarina glauca</i>	Swamp she-oak	Poor	Poor	Very Low
490	<i>Casuarina glauca</i>	Swamp she-oak	Poor	Poor	Very Low
491	<i>Casuarina glauca</i>	Swamp she-oak	Fair	Fair	Medium
493	<i>Casuarina glauca</i>	Swamp she-oak	Poor	Poor	Very Low

Table 1. Possible trees to be removed due to batter.

The project Arborist will where possible make alterations to achieve as many as possible of these above trees be retained during the construction stage.

The above thirty-two (32) trees only 1 tree No 284 had good health and good structure. Eighteen (18) trees had fair health but seven (7) of these trees had poor structure and thirteen (13) trees had poor health with one tree No 218 having a hazards structure.

The STARS assessment found that of the trees to be removed, one tree No 284 was recorded as being of high retention value. Eleven (11) trees were recorded as medium retention value. Seven (7) trees were recorded as low retention value and thirteen (13) trees were recorded as very low retention value. Accordingly, the proposal only removes twelve (12) trees that are considered worthy of retention.

The project Arborist will seek to retain as many trees as possible. The twelve (12) trees considered worthy of retention will be tried to be retained if possible

Tree Protection Measures

There will be some work in and around the existing trees that will need to be protected during construction. Tree protection measures are outlined as follows:

- An experienced consulting Arborist with a minimum AQF Level 5 qualification is to be engaged as the Project Arborist, throughout the detailed design phase and construction process to comment on any alterations to the design which may occur due to conditions of consent imposed by the consent authority.
- The Project Arborist is to review all existing tree protection measures and update them to ensure that they respond to any alterations of design or methodology.
- The Project Arborist is to supervise the installation of the tree protection fencing. This is to minimise any impacts to the retained trees TPZ areas. The current soil batter in some cases will require the adjustment of the TPZ fencing under the directions of the Project Arborist.
- The project Arborist shall review, amend and finalise the tree protection plans in consultation with the head contractor.
- The project Arborist is to create a site induction process in relation to tree protection measures and requirements.
- The project Arborist is to meet with all head contractors and explain the requirements in relation to the trees.
- There will be a hold point at the completion of each stage of works. The project Arborist will review the next stage of works and confirmed that the tree protection measures have been installed correctly and are fit for purpose.
- Certification reports are to be provided to the PCA at key stages of construction.
- The Project Arborist is to supervise any works within the TPZ or SRZ of retained trees.
- The Project Arborist is to make inspections to monitor the trees and ensure that the tree protection measures are still in place and effective.
- If tree roots greater than 40mm in diameter within the TPZ of a retained tree are discovered during works, the tree roots must be retained and protected from damage or desiccation until the Project Arborist has inspected, assessed and photographed the tree roots. A detailed log must be kept by the Project Arborist, detailing any significant tree roots which are encountered and what measures were taken.

- When working outside of a TPZ, any tree roots greater than 100mm must be retained and protected from damage or desiccation until the Project Arborist has inspected, assessed and photographed the tree roots. A detailed log must be kept by the Project Arborist, detailing any significant tree roots which are encountered and what measures were taken.

CONTENTIONS

I respond to the contentions as follows

Contention 4.1 – the plans in Annexure 1 identify the trees to be removed and retained.

Contention 4.2 – we understand the original application was to remove all trees on Old Castlereagh Road however the current proposal is to only remove the trees identified in this report. There are no other trees within the development footprint that require removal.

Contention 4.3 – this report addresses this contention.

Contention 4.4- bulk earthwork plan is attached and the relevant impacts are addressed in this report.

RECOMMENDATION:

The following recommendations have been listed for the construction works:

1. Twenty-nine (29) trees are removed for Road 3 entry to the site.
2. Three (3) trees are removed at the toe of the batter along Old Castlereagh Road.
3. Potential for up to (32) trees to be retained or removed after further assessment at the construction stage.
4. Tree protection measures in this report to be adhered to during construction.

If you require any further information in relation to this report, please contact us on 0418 474796.



Hugh Taylor

Director Australian Tree Consultants Pty Ltd
 Member Arboriculture Australia
 BA (L) Major in Wilderness Management/Outdoor Education.
 Diploma Horticulture – Arboriculture (Level 5)
 Arborist/ Tree Surgeon/ Horticulturist
 Certificate IV Occupational Health & Safety
 QTRA No 2650



Thomas Taylor

Environmental Scientist/ Consulting Arborist
 BNatSc (Environmental Management)
 Diploma of Arboriculture (Level 5)
 Diploma of Environmental Monitoring and Technology
 QTRA No 6741

LIMITATION OF LIABILITY

Australian Tree Consultants Pty Ltd and their employees are tree specialists who use their qualifications, education, knowledge, training, diagnostic tools and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce the risk of living near trees. Clients may choose to accept or disregard the recommendations of this assessment and report.

Australian Tree Consultants Pty Ltd and its employees cannot detect every condition that could possibly lead to the structural failure of a tree. Trees are living organisms that sometimes fail in ways the arboriculture industry does not fully understand. Conditions are often hidden within trees and below ground. Unless otherwise stated, observations have been visually assessed from ground level. Australian Tree Consultants Pty Ltd cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Likewise, remedial treatments cannot be guaranteed.

Treatment, pruning and removal of trees may involve considerations beyond the scope of Australian Tree Consultants Pty Ltd services, such as property boundaries and ownership, disputes between neighbours, sight lines, landlord-tenant matters, and related incidents. Australian Tree Consultants Pty Ltd cannot take such issues into account unless complete and accurate information is given prior or at the time of the site inspection. Likewise Australian Tree Consultants Pty Ltd cannot accept responsibility for the authorisation or non-authorisation of any recommended treatment or remedial measures undertaken.

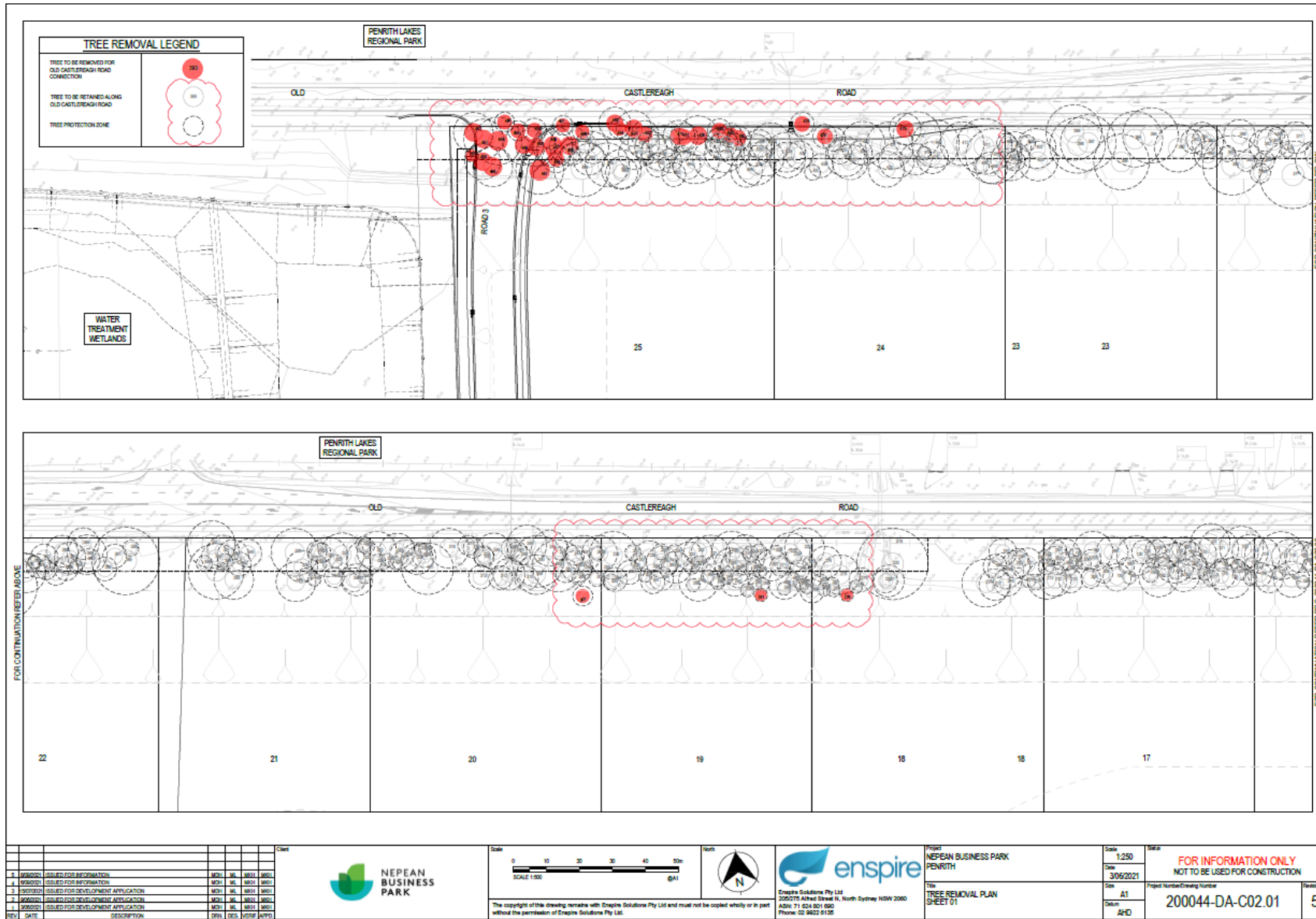
In the event that Australian Tree Consultants Pty Ltd recommends retesting or inspection of trees at stated intervals or installs any cable/s, bracing systems and support systems, Australian Tree Consultants Pty Ltd must inspect the system installed at intervals not greater than 12 months unless otherwise specified in written reports. It is the client's responsibility to make arrangements with Australian Tree Consultants Pty Ltd to conduct the re- inspection.

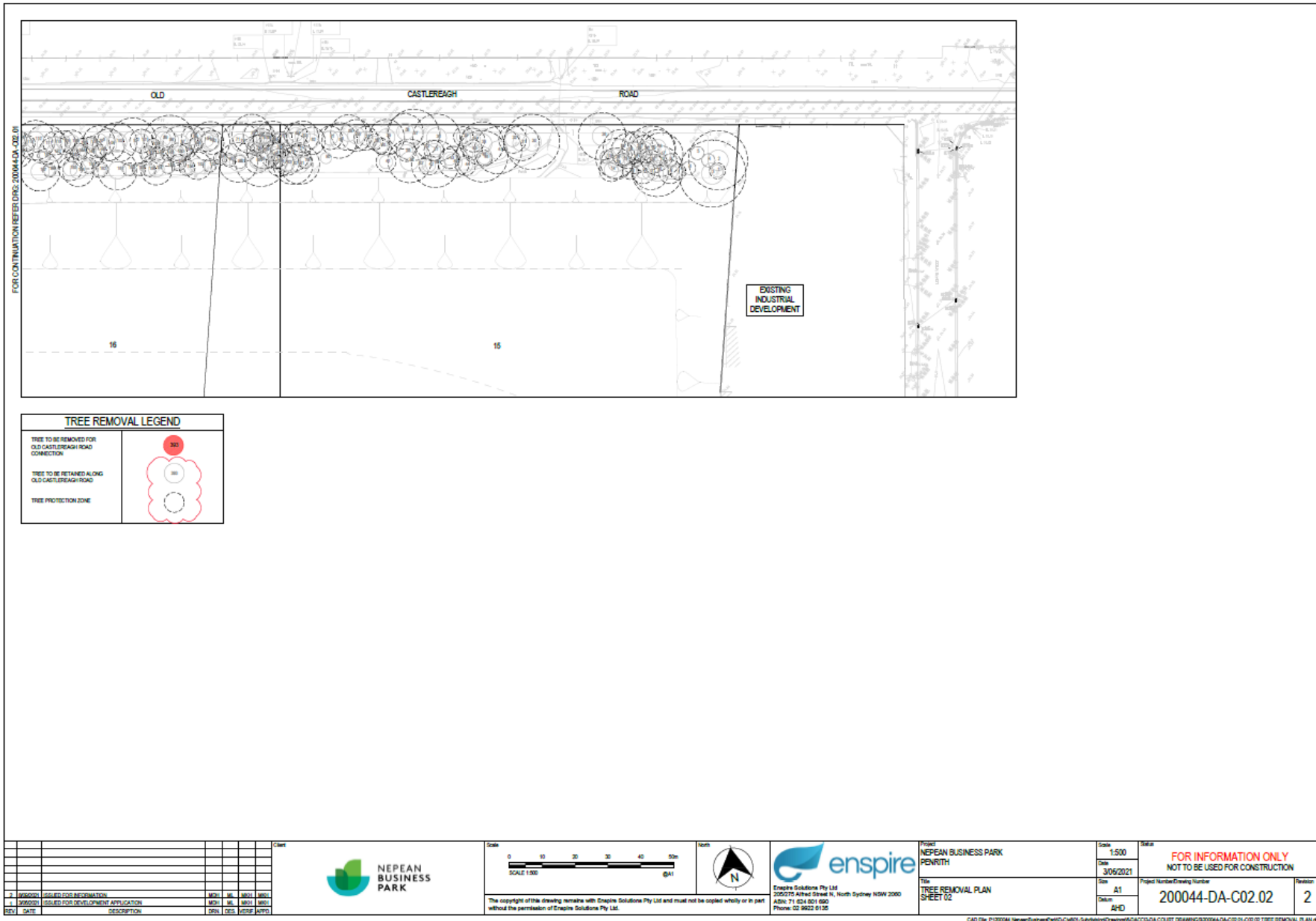
Trees can be managed, but they cannot be controlled. To live or work near a tree involves a degree of risk. The only way to eliminate all risks associated with a tree is to eliminate the tree.

All written reports must be read in their entirety, at no time shall part of the written assessment be referred to unless taken in full context of the whole written report.

If this written report is to be used in a court of law or any legal situation Australian Tree Consultants Pty Ltd must be advised in writing prior to the written assessment being presented in any form to any other party.

Appendix 1. Enspire Solutions Plans 200044-DA-C02.01 8/9/2021 Sheets 1 & 2





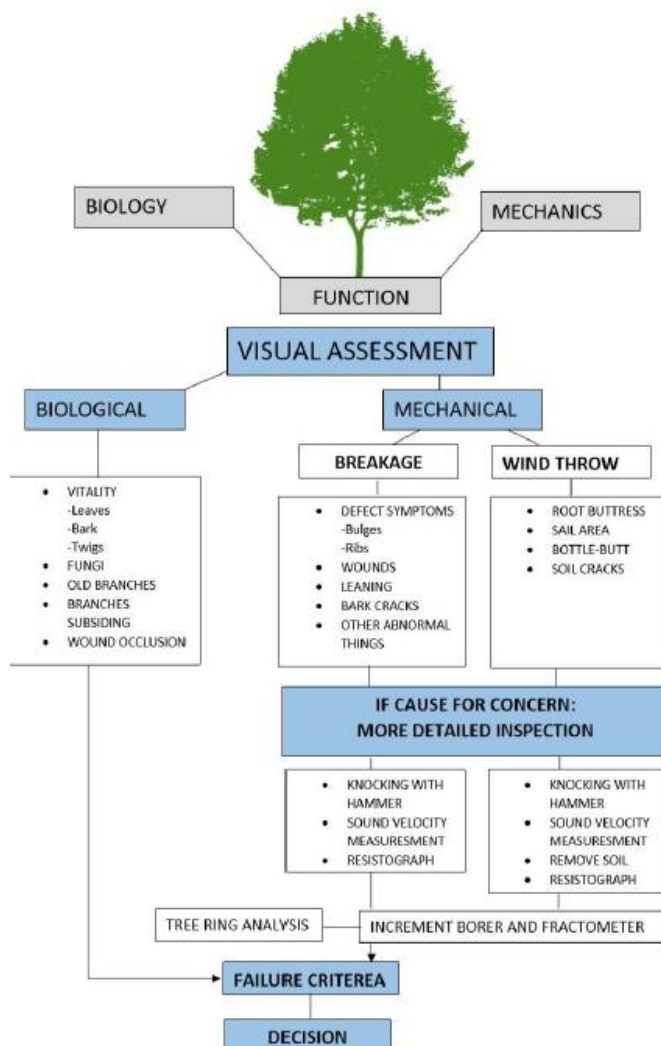
Appendix 2. Electronic excel file – Southern Wetlands Site A

Appendix 3 Tree Assessment Methodology

1A - VISUAL TREE ASSESSMENT (VTA)

The VTA system is based on the theory of tree biology and physiology, as well as tree architecture and structure. This method is used by arborists to identify visible signs on trees that indicate good health, or potential problems. Symptoms of decay, growth patterns and defects are identified and assessed as to their potential to cause whole-tree, part-tree and/or branch failure. This system (represented by the image below) is based around methods discussed in 'The Body Language of Trees'¹.

For the purpose of this report, elements of the VTA system have been used, along with industry standard literature, and other relevant studies that provide an insight into potential hazards in trees. This assessment is a snapshot of what could be reasonably seen or determined from a basic visual inspection. The VTA system is generally used as a means to identify hazardous trees; however, it is important to realize that for a tree to be hazardous there must be a target; a hazard poses no risk if there is no exposure to the hazard.



¹ Mattheck, C. & Breloer, H. 1994. *The Body Language of Trees*

2B – HEALTH ASSESSMENT

The health of a tree is primarily assessed by looking at the tree canopy and how well it is performing. Certain indicators provide information on which to base the assessment. Abnormally small leaves, chlorosis (yellowing), sparse crown, wilting, lack of lustre and die-back can be signs of ill-health or decline but may also be related to a temporary imbalance due to drought or pest infestations. Epicormic growth can be a sign of stress and low energy reserves but can also be related to increased light levels through the removal or pruning of adjacent trees. Extension growth can be a good indicator of vigour, but this can vary greatly between species and under differing climatic conditions. For these reasons, each individual symptom or observation needs to be assessed with objectivity and consideration of all available information.

2C – STRUCTURAL ASSESSMENT

The structural assessment of trees is carried out using the basic framework of Visual Tree Assessment. Signs and symptoms of defects are assessed to gauge the likelihood of failure, because not every defect constitutes a hazard e.g. "...co-dominant stems are a structural defect. The severity of the defect is increased by included bark, large crowns and strong wind."¹¹ If trees were removed purely on the basis that there were defects present without assessing the likelihood of failure or whether practical mitigation measures are available, the urban forest would cease to exist. A basic Visual Tree Assessment is undertaken from ground level, if defects are suspected further investigation may be required and recommended.

"[When using] the Visual Tree Assessment (VTA) procedure for assessing trees, as the suspicion increases that defects are present, the examination becomes more thorough and searching."²

"Some defects, especially some forms of decay, do not give rise to external signs and therefore tend to escape detection in a purely visual survey. If there is no reason for suspecting a hidden defect to occur within a particular part of the tree, there is no reasonable basis for carrying out a detailed internal assessment. Although in theory an unsuspected defect might be detectable by the use of specialized diagnostic devices, this would be impracticable in the absence of some external sign to indicate the place which should be probed. Also, internal examination without good reason is undesirable, as it usually causes injury to the tree and is unreasonably time consuming and costly."³

³ Matheny, N. & Clark, J. 1994. *A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas*.
² Lonsdale. 1999. *Principles of Tree Hazard Assessment and Management*.

2D - TREE PROTECTION ZONE (TPZ) & STRUCTURAL ROOT ZONE (SRZ) CALCULATIONS

In accordance with Australian Standard AS4970-2009 Protection of trees on development sites⁴, Tree Protection Zone (TPZ) radius is calculated using the following procedure. Diameter of the trunk is measured at approximately 1.4m above ground level; this measurement is referred to as DBH (Diameter at Breast Height). RTPZ = DBH X 12. For multi-stemmed trees the formula used is RTPZ = $\sqrt{[(DBH1)^2 + (DBH2)^2 + (DBH3)^2]}$. The TPZ is measured radially from the centre of the stem and must be protected on all sides.

The Structural Root Zone (SRZ) radius is calculated by measuring the diameter of the stem close to ground level, just above the basal flare. This measurement is taken as D and then used in the following formula: RSRZ = $(D \times 50)^{0.42} \times 0.64$ and becomes the Structural Root Zone, measured radially from the centre of the stem.

It is important to realize that these calculations provide a notional figure only and tree dynamics, form and site conditions will greatly affect these zones, and it is the job of the arborist to interpret the information correctly.

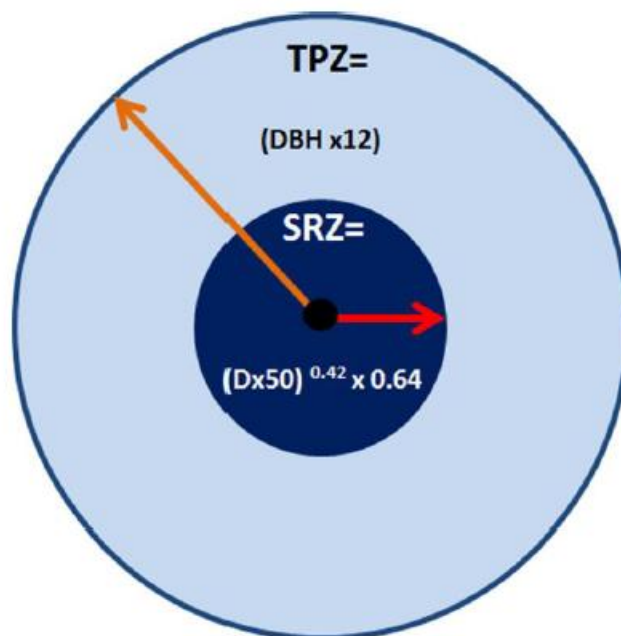


Fig 1. A representation of TPZ and SRZ calculations.

For palms, cycads, tree ferns, and similar monocots, the TPZ is positioned at least 1m outside the crown projection. SRZs are not applicable to these plant types.

AS4970-20093 states "a TPZ should not be less than 2m nor greater than 15m (except where crown protection is required" and the minimum radius for an SRZ is 1.5m.

⁴ Standards Australia. 2009. AS4970-2009 Protection of trees on development sites.

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 2001.

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 qualitative 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. An example of its use in an Arboricultural report is shown as Appendix A.

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 Councils 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 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 dimension 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 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 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 monocultural stand in its entirety e.g. hedge.

Table 1.0 Tree Retention Value - Priority Matrix.

		Significance				
		1. High	2. Medium	3. Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape	Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
Estimated Life Expectancy	1. Long >40 years					
	2. Medium 15-40 Years					
	3. Short <1-15 Years					
	Dead					

Legend for Matrix Assessment	
	Priority for Retention (High) - 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.
	Consider for Retention (Medium) - These trees may be retained and protected. These are considered less critical; however their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
	Consider for Removal (Low) - These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
	Priority for Removal - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

USE OF THIS DOCUMENT AND REFERENCING

The IACA Significance of a Tree, Assessment Rating System (STARS) is free to use, but only in its entirety and must be cited as follows:

IACA, 2010, *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, Australia, www.iaca.org.au

REFERENCES

Australia ICOMOS Inc. 1010. *The Burra Charter – The Australian ICOMOS Charter for Places of Cultural Significance*, International Council of Monuments and Sites, 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 2011, *Footprint Green Tree Significance & Retention Value Matrix*, Avalon, NSW Australia, www.footprintgreen.com.au

IACA 2010, *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, www.iaca.org.au

Appendix 5. Tree Projection Plan

The subject site will require tree protection of four hundred and thirty (430) trees which will require protection throughout the proposed development. This plan will identify and specify the tree protection measures required to enable the successful preservation of all trees which are proposed retention. It may be possible with onsite supervision to also retain some additional trees along the batter. The decision to retain or remove these trees will be made on site by the project Arborist.

If the development is approved, it is recommended that this plan be reviewed and further detailed to address any additional conditions of consent imposed by the consent authority and to consider any further measures which may arise following the detailed design phase.

TPP PART 1- SPECIFICATIONS

A. TREE PROTECTION FENCING

Tree protection fencing must be used to isolate all retained trees from construction activity. The tree protection fencing is to be installed at the extent of the tree protection zones for all retained trees. This will be installed under the direct supervisor of the project Arborist. The current soil batter may require adjustment to the TPZ fencing and this will occur at the time of the installation.

The fencing must be installed before any machinery or materials are brought onto the site and before the commencement of works including demolition.

Once installed the protective fencing must not be removed or altered without approval by the project arborist.

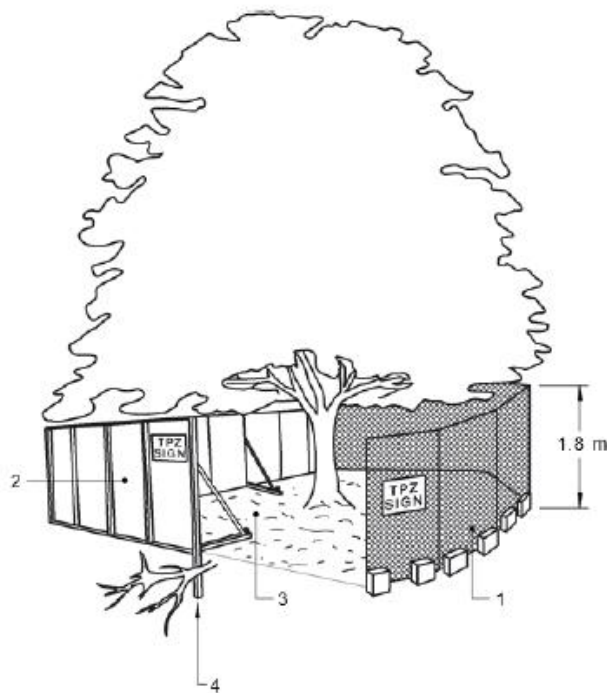
The TPZ should be secured to restrict unauthorized access.

AS 4687-2007 Temporary Fencing and Hoardings specifies the appropriate fencing requirements. For larger areas, star pickets with rope or rope with flags is appropriate to identify the exclusion zone.

Fence posts and supports should be located clear of exposed tree roots.

Existing perimeter fencing and other structures may be suitable as part of the protective fencing.

There is to be no tree pruning to enable the installation of TPZ fencing. Where branches from retained trees conflict with the TPZ fencing alignment, the fencing is to be relocated to enclose the branches to provide canopy protection.



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 project 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.

An example of tree protection fencing. Image from AS4970-2009 The Protection of Trees on Development Sites. (Standards Australia-AS4970-2009- The Protection of Trees on Development Sites)

B. TREE PROTECTION SIGNAGE

Signs identifying that the area is a restricted TPZ should be placed around the edge of the TPZ and placed every twenty (20) metres of fencing.

The TPZ signs must be visible from all angles within the development site. The lettering on the sign must comply with AS 1319-1994 Safety Signs for the Occupational Environment.

The signs are to be a minimum of A4 size and must contain the contact details of the Site manager or foreman and the project Arborist.

The signs must be hard-wearing such as metal, plastic or laminated paper and affixed securely to the TPZ fencing with cable ties or wire.



An example of tree protection signage. Image from AS4970-2009.9

C. SEDIMENT AND EROSION CONTROL FENCING

Soil erosion and sediment fencing is to be attached to the tree protection fencing. There is to be no additional excavation within the tree protection zone to install sediment and erosion fencing.

Where sediment and erosion control is required within a TPZ, above ground control measures must be used such as coir logs or hay bales.



This image shows sediment fencing incorporated into the tree protection fencing.

D. GROUND PROTECTION MEASURES

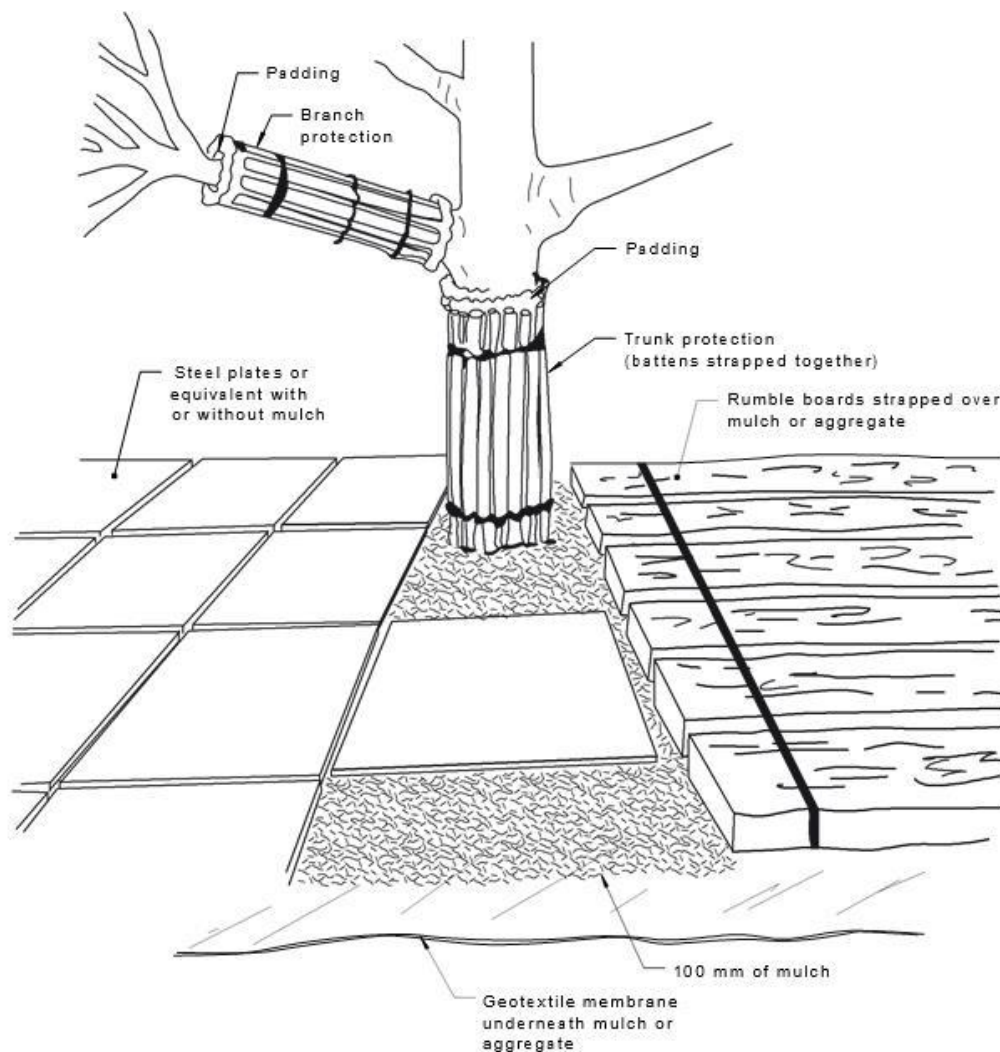
Ground protection measures are to be implemented whenever there is the need for access into a tree protection zone.

The type of ground protection is dependent on the type of access required i.e. pedestrian walkway or heavy vehicle access road.

Where vehicle access is required, ground protection may be provided in the form of geo-textile fabric topped with 100-150mm depth of aggregate or woodchip with hardwood rumble boards strapped together with steel strapping on top.

Alternatively, if the access is for foot traffic and light-weight vehicles 100mm depth of woodchip with track mats on top would be sufficient.

Given the site soil is very sandy, soil compaction will not be the main concern, rather physical damage to larger surface roots, the disturbance of the soil and physical damage to the smaller tree roots in the very top of the soil profile.



An image showing ground protection measures and trunk and branch protection.

E. TRUNK AND BRANCH PROTECTION

Trunk and branch protection is to be used when works must be completed within the TPZ of a retained tree or when access is required for machinery.

If machinery access is required, the trunk and branch protection will be used in combination with ground protection measures as discussed in section D (above).

The image above shows a representation of trunk and branch protection which is usually installed to a minimum height of 2 metres above ground level.

Where there is the potential for impacts to branches or stems above this height, the project Arborist will specify the additional locations where protection will be required.

Trunk and branch protection is to be installed in accordance with AS4970-2009 and must be certified as being fit for purpose and installed in accordance with AS4970-2009.

The trunk and branch protection will comprise of hessian wrapping, carpet underlay or similar to provide padding for the trunk.

Timber boards a minimum of 90mm in width and 35mm in thickness shall then be installed around the padding at 100mm spacings and held firmly in place with steel strapping or wire.

No nails or screws are to be used to affix the boards directly to the tree in any way.