URBAN TREE MANAGEMENT

CONSULTING ARBORICULTURISTS & HORTICULTURISTS

Urban Tree Management Australia Pty Ltd
ACN 098 599 805
ABN 56 098 599 805

65 Excelsior Street
Merrylands NSW 2160

Phone 02 9760 1389

admin@utma.com.au
www.utma.com.au

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IACA
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REPORT:

ARBORICULTURAL IMPACT ASSESSMENT

Maari Mia Wilcannia Clinic
&
Wellbeing Centre
Lots 2, 3 & 4 DP1201089 &
Lot 111 DP 1201028, Bonney Street
Wilcannia NSW

Prepared 5 March 2021
Reference 23037

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SUMMARY and CONCLUSIONS

This report considers 1 tree, Tree 1 *Eucalyptus largiflorens* – Black Box (*the tree*), located within Lot 111 DP 1201028, Bonney Street, Wilcannia NSW as part of a site being developed including adjoining Lots 2, 3 and 4 DP1201089 Bonney Street, Wilcannia (*the site*) by the development and construction of the Maari Mia Wilcannia Clinic and Wellbeing Centre.

Statutory Considerations

The site is located in the Central Darling Shire Council (CDSC) Local Government Area (LGA) and *the tree* requires consideration for protection subject to development under the following planning instrument.

Central Darling Local Environmental Plan 2012 The Central Darling Local Environmental Plan 2012 (CDLEP2012) is the local environmental planning legislation that applies to the Central Darling Shire Council area.

PLAN OF MANAGEMENT (PoM)– Lots 2, 3 and 4 DP 1201089, and Lot 111 DP 1201028, Bonney Street Wilcannia, Issue A, February 2020, Central Darling Shire Council.

"The Local Government Act 1993 (the 'Act') requires all Council-owned land to be classified as either 'Community' land or 'Operational' land. Land classified as 'Community' land is to be managed and used in accordance with an adopted Plan of Management."

The Development Of Community Land Lots (PoM)

"The land Lots 2, 3 and 4 DP 1201089, and Lot 111 DP 1201028, Bonney Street Wilcannia are owned and managed by the Central Darling Shire Council. The current use of the land is for general community use – water supply. The proposed development and use for this land will continue to be general community use but primarily be for the purpose of – Health Draft Plan of Management Report – Community lands – Lots 2,3 and 4 DP1201089 and Lot 111 DP 1201028 Bonney Street, Wilcannia."

"Services facility - community health facility. as authorised by the Plan of Management and other applicable statutory provisions. All buildings on the land will be permitted to be used for the purpose of a community health facility."

Environmental Planning and Assessment Act 1979 (EP&A Act)

"The EP&A Act establishes the statutory planning framework or basis for environmental and land use planning and the development consent process for the use and development of land within New South Wales. Section 4.15 of Part 4 of the EP&A Act outlines the factors that must be considered when a development application is assessed. These include:

- *Any environmental planning instrument;*
- *Any draft environmental planning instrument that has been placed on public exhibition and details of which have been notified to the consent authority;*
- *Any development control plan;*
- *The Regulations;*
- *The likely impacts of the development, including environmental impacts on both the natural and built environment, and social and economic impacts on the locality;*
- *The suitability of the site for the development;*
- *Any submissions made in accordance with the Act or the Regulations; and*
- *The public interest."*

"The likely impacts of the development, including environmental impacts on both the natural and built environment, and social and economic impacts on the locality" This point applies to the remnant tree on *the site* as part of the natural environment, the subject of this report.

3.5 Aboriginal Cultural Significance (PoM)

"The Central Darling Shire Council (Wilcannia, Menindee, Ivanhoe, White Cliffs, Tilpa area) is located in the country of the Paakantji , Barkindji and the Ngiyampaa people, the Council wish to acknowledge the traditional owners of the land.

The community land covered within this Plan of Management is not currently identified as having Aboriginal significance and have not been declared under section 84 of the National Park and Wildlife Act 1974, however, any areas of Aboriginal significance that may be discovered are covered by this Plan of Management."

The subject tree contains a basal wound to the south with advanced occlusion and deep wound margins indicative of likely Aboriginal cultural origin and therefore of Aboriginal Cultural Significance.

Central Darling Local Environmental Plan 2012 (CDLEP2012)

"The land use zone permits certain uses of the land, where the land use zone does not permit the current land use or activity on the land a planning proposal to amend the Central Darling Local Environmental Plan 2012 is required. The lots subject to this Plan of Management has the following land use zone: Central Darling Local Environmental Plan 2012 Zone R1 General Residential

1 Objectives of zone

- *To provide for the housing needs of the community.*
- *To provide for a variety of housing types and densities.*
- *To enable other land uses that provide facilities or services to meet the day to day needs of residents.*
- *To minimise land use conflict between land uses on land within the zone and land uses on land within adjoining zones.*

Note: *the proposed use of the land for "Health Services facility - community health facility" is not a prohibited use therefore, may be approved through the development application process to assess the merits of the health services facility – Maari Ma Community Health Clinic."*

Biodiversity Values Map and Threshold Tool (NSW Government, DPIE)

The site is not represented on the Natural Resources Sensitivity Land Map (Appendix G, Tree Location Plan, 3 of 3) although adjacent to the Darling River which is represented om the map.

The recommendations made in this report are subject to approval by the consent authority.

Tree Assessment

The tree/s assessed are numbered and their genus, species and common name included in Appendix F - Tree Assessment. Tree numbers are marked on Appendix G – Tree Location Plan.

Removal

No trees the subject to this report are proposed to be removed.

Retention

Tree 1 (1 tree) is to be retained and protected. The tree has dead branches that may require pruning and some crown projection may require pruning to clear for access for building construction. A wire cable was observed constricting a structural branch in the lower crown to south and the cable is to be remove.

No Encroachment

N/A

Minor or No Encroachment

This does not apply to the subject tree as encroachment is >10% of the radial area of the Tree Protection Zone. Whereas, encroachment per AS4970 (2009) Section 3, 3.3.2 *Minor Encroachment* is from development works within <10% of the radial area of the Tree Protection Zone.

Major Encroachment

Tree 1 (1 tree) is to be retained and will be subject to a major encroachment as per AS4970 (2009) Section 3, 3.3.3 *Major Encroachment* from development works within >10% of the radial area of the Tree Protection Zone. The TPZ encroachment is approximately 15% which should be sustainable subject to the application of the tree protection works per the Tree Protection Plan (Appendix H) and will be mitigated by the use of *tree sensitive* pier footing for buildings and pedestrian ramps and to a lesser extent by unitary pavers as footpaths near the tree. There is no encroachment into the Structural Root Zones (SRZ) of the retained tree. Much of the soil around the tree appears to be uneven and some is expected to be aeolian sand with natural grade concealed. Therefore excavation for paths north of the tree may have a reduced impact depending on the finished levels and subject to *tree sensitive* excavation.

The retention and protection of Tree 1 provides amenity and screening of views within the site subject to some minor pruning and other minor remedial works. The tree has an almost occluded trunk wound which is considered to have been historically modified by Aboriginal cultural activities and therefore is significant as an Aboriginal Scarred Tree. The Tree Protection Zone (TPZ) setbacks and protection specifications for *the tree* provided in Appendix H - Tree Protection Plan are satisfactory to retain and protect *the tree*.

Tree Significance

Determined by using the Tree Significance - Assessment Criteria of the *IACA Significance of a Tree, Assessment Rating System* (STARS)© (IACA, 2010), Appendix A. The trees are rated, High, Medium or Low. The number of trees in each category is summarised in Table 1.0. The STARS significance rating of each individual tree is shown in Appendix F – Tree Assessment.

Table 1.0 Tree Significance – summary of trees in different categories using the Significance of a Tree, Assessment Rating System (STARS)© (IACA, 2010).

Significance Scale	High	Medium	Low
Number of trees in each category	1	0	0

Tree Retention Value

Determined by using the Retention Value – *Sustainable Retention Index Value* (SRIV)© (IACA, 2010), Appendix D. The trees are rated, High, Medium, Low or Remove. The number of trees in each category is summarised in Table 2.0. The SRIV retention rating of each individual tree is shown in Appendix F – Tree Assessment.

Table 2.0 Retention Value - summary of trees in different categories using the Sustainable Retention Index Value (SRIV)© (IACA, 2010).

Retention Value	High Priority for Retention	Medium Consider for Retention	Low Consider for Removal	Remove Priority for Removal
Number of trees in each category	1	0	0	0

Tree Protection Setbacks

Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) setbacks are based on Australian Standard AS4970 2009 Protection of trees on development sites, Section 3 Determining the protection zone of the selected trees, see Appendices B and D, respectively. Approved building works should be no closer, including excavation, than the dimensions stated above, save for

AS4970(2009) sec. 3.3 Variations to the TPZ, 3.3.2 Minor Encroachment - *If the proposed encroachment is less than 10% of the area of the TPZ and is outside the SRZ, detailed root investigations should not be required. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ; and sec 3.3.3 Major Encroachment - If the proposed encroachment is greater than 10% of the area of the TPZ or inside the SRZ the project arborist must demonstrate that the tree(s) would remain viable. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ."* The trees requiring TPZ and SRZ protection setbacks are shown in a table in the Tree Protection Plan.

1.0 INTRODUCTION

Urban Tree Management © has prepared this report for Troppo Architects 28 East Terrace, Adelaide, South Australia 5000. The land is located in Central Darling Shire Council (CDSC) Local Government Area (LGA) and the tree is protected subject to the Central Darling Local Environmental Plan 2012 (CDLEP2012) and the Plan of Management (PoM)– Lots 2, 3 and 4 DP 1201089, and Lot 111 DP 1201028, Bonney Street Wilcannia (Central Darling Shire Council, 2020).

It is proposed to redevelop the land and construct the Maari Mia Wilcannia Clinic and Wellbeing Centre. This will include the retention and protection of the 1 tree at *the site* and its incorporation into the building and landscaping works for the project. Minor encroachment will be mitigated by the application of *tree sensitive* piers for the building and pedestrian access ramp and hand excavation to determine root location for the pedestrian pavement at the drop off zone. Some minor crown pruning for building clearance for safe working access and remedial works may be required, see (Appendix H - Tree Protection Plan) but is expected to be sustainable by the tree.

Danny Draper (*the author*) attended Lot 111 DP 1201028, Bonney Street, Wilcannia NSW (*the site*) on Tuesday 23 February 2021 and *the tree* and its growing environment were examined by a Visual Tree Assessment (VTA) (Mattheck & Breloer, 1994) conducted from the ground for the development works at *the site* (Appendix F – Tree Assessment).

The site is subject to a Plan of Management and this report and any works recommended herein, that require approval from the consenting authority are provided to form part of that development application process and its Consent Conditions. The Tree Location Plan (Appendix G) and Tree Protection Plan (Appendix H) are to be included into and used in conjunction with the set of plans for the site.

The aims and objectives of this report are to detail and comply with the tree protection requirements specified in AS4970 (2009) *Protection of trees on development sites*, after the undertaking of the Preliminary Tree Assessment AS4970 sec. 2.3.2, and Preliminary Arboricultural Report AS4970 sec. 2.3.3 (which may be combined); Development Design and Review Report AS4970 sec. 2.3.4, prior to the undertaking of an Arboricultural Impact Assessment (AIA) Report AS4970 sec. 2.3.5. Where the other reports have not been undertaken the AIA Report will broadly endeavour to identify and assesses the condition of the subject tree/s; determine the impact of development on the subject tree/s; provide recommendations for retention or removal of the subject tree/s; provide specifications for protection of tree/s to be retained, and provide recommendations for replacement tree/s where appropriate. The information in this extensive report is intended to provided tree management and protection through all stages of development.

The tree/s are indicated in Appendix G – Tree Location Plan. This report has relied upon the following plan/s and documents:

- Roof Plan (further reduced), Job No.: 480, Scale 1:200 @ A3, Dwg No.: 02, prepared by Troppo Architects 28 East Terrace, Adelaide, South Australia 5000, t. +61 8 8232 9696.
- Detail Survey at Bonney Street, Wilcannia for Proposed Medical Clinic, Scale 1:400 @ A2, Reference T19-8D, date 13/02/2020 prepared by Graham F. Howe Registered surveyor, 515 Wyman Lane, Broken Hill NSW 2880, t. 08 8087 3660.
- Central Darling Local Environmental Plan 2012 (2013 EPI 33), Land Zoning Map – Sheet LZN_006A.
- Biodiversity Values Map

METHODOLOGY

Note: Individual methodologies applied as applicable.

2.1 The method of assessment of tree/s applied is adapted from the principles of Visual Tree Assessment (VTA) (Mattheck & Breloer, 1994), undertaken from the ground, which considers and includes:

1. Tree health and subsequent stability, both long and short term
2. Sustainable Retention Index Value (SRIV) Version 4 (IACA, 2010) ©
3. Hazard potential to people and property
4. Amenity values
5. Habitat values
6. Significance – Significance of a Tree, Assessment Rating System (STARS) (IACA, 2010) ©

2.2 Tree Assessment - This assessment is undertaken using standard tree assessment criteria for each tree based on the values above and is implemented as a result of at least one comprehensive and detailed site inspection to undertake a visual tree assessment of each individual tree, or stand of trees, or a representative population sample. See Appendix F – Tree Assessment.

2.3 Any dimensions recorded as averages, or by approximation are noted accordingly.

2.4 This report adopts Australian Standard AS4970 (2009) *Protection of trees on development sites* as a point of reference and guide for the recommended minimum setbacks (Appendix B) from the center of a tree's trunk to development works and the distances may be increased or decreased by the author in accordance with AS4970 as a result of other factors providing mitigating circumstances or constraints as indicated by but not restricted to the following:

1. Condition of individual trees,
2. Tolerance of individual species to disturbance,
3. Geology e.g. physical barriers in soil, rock floaters, bedrock to surface
4. Topography e.g. slope, drainage,
5. Soil e.g. depth, drainage, fertility, structure,
6. Microclimate e.g. due to landform, exposure to dominant wind,
7. Engineering e.g. techniques to ameliorate impact on trees such as structural soil, gap graded fill, lateral boring,
8. Construction e.g. techniques to ameliorate impact on trees such as pier and beam, bridge footings, suspended slabs,
9. Root mapping,
10. Physical limitations - existing modifications to the environment and any impact to tree/s by development e.g. property boundaries, built structures, houses, swimming pools, road reserves, utility services easements, previous impact by excavation, or construction in other directions, soil level changes by cutting or filling, existing landscaping works within close proximity, modified drainage patterns,
11. Extraneous factors e.g. potential future impacts from development on adjoining land when the tree is located on or near to a property boundary.

2.5 Stands of Trees - Trees in groups may be referred to as stands and a stand may exclusively contain specimens to be either retained or removed or a combination of both. A stand may be used to discuss all the trees on a given site to expedite their assessment, or refer to trees growing proximate to one another or within a defined space. Stands may be comprised by mass boundary or screen plantings, to form a group of the same or a mixture of taxa. Each stand is considered as a single unit with each component tree assessed and expressed in tabular form, or indicated by a given percentage as a population sample of each stand. Where it is appropriate for a stand of trees to be retained in full or part, the location and setback of Tree Protection Zone fences or works, are prescribed to provide for the preservation of the stand or selected component trees, in a condition not less than that at the time of initial inspection for its incorporation into the existing landscape of the site, or in a reduced but sustainable condition due to the impact of the development but ameliorated through tree protection measures.

2.6 Tree Significance - The trees/s have been allocated a significance rating as determined by using the Tree Significance - Assessment Criteria of the IACA Significance of a Tree, Assessment Rating System (STARS)© (IACA, 2010), Appendix A.

2.7 The meanings for terminology used herein are taken from the IACA Dictionary for Managing Trees in Urban Environments 2009. An extract from the IACA Dictionary forms a glossary of terms included as Appendix E.

3.0 PRUNING STANDARDS

3.1 Any pruning recommended in this report is to be to the Australian Standard® AS4373 *Pruning of amenity trees*, and conducted in accordance with the *Guide to Managing Risks of Tree Trimming and Removal Work*, July 2016, Safe Work Australia.

3.2 All pruning or removal works are to be in accordance with the appropriate Tree Management Policy where applicable, or Tree Management Order (TMO), or Tree Preservation Order (TPO).

3.3 Tree maintenance work is specialised and in order to be undertaken safely to ensure the works carried out are not detrimental to the survival of a tree being retained, and to assist in the safe removal of any tree, should be undertaken by a qualified Arboriculturist with appropriate competencies recognised within the Australian Qualification Framework, with a minimum of 5 years of continual experience within the industry of operational amenity arboriculture, and covered by appropriate and current types of insurance to undertake such works.

4.0 RECOMMENDATIONS

4.1 Tree 1 (1 tree) is proposed to be retained and protected as part of the project the subject of this report as shown in Appendix G - Tree Location Plan and Appendix H – Tree Protection Plan.

4.2 Where Tree Protection Zone works are to be modified this must be undertaken in consultation with the Project Arborist to ensure that tree protection is maintained.

4.3 Tree 1 (1 tree) may require crown pruning to remove deadwood and to reduce crown projection for building clearance and safe working access as detailed in Appendix H – Tree Protection Plan and should be conducted in accordance with 3.0 Pruning Standards.

4.4 Tree 1 (1 tree) may require root pruning for excavation works subject to tree sensitive hand excavation. Where required it is to be undertaken as detailed in Appendix H – Tree Protection Plan and should be conducted in accordance with 3.0 Pruning Standards.

Danny Draper
Principal Consultant
IACA ACM0012003
Urban Tree Management Australia P/L
Dip. Hort. (Arboriculture)(AQF 5),
Assoc. Dip. Hort. (Pk. Mgmt.),
Hort. Cert.
TRAQ (IAS) Tree Risk Assessment

REFERENCES

1. Central Darling Shire Council, Plan of Management (PoM) – Lots 2, 3 and 4 DP 1201089, and Lot 111 DP 1201028, Bonney Street Wilcannia, Issue A, February 2020, Central Darling Shire Council, viewed 5/03/2021, https://www.centraldarling.nsw.gov.au/f.ashx/21Councilmeetings/21February/11-9.6a-PLAN-of-Management-Report-Bonney-St-10-2-2021.pdf

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3. IACA, 2010, *Sustainable Retention Index Value (SRIV)*, Version 4, A visual method of objectively rating the viability of urban trees for development sites and management, based on general tree and landscape assessment criteria, Institute of Australian Consulting Arboriculturists, Australia, www.iaca.org.au

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DISCLAIMER

The author and Urban Tree Management take no responsibility for actions taken and their consequences, contrary to those expert and professional instructions given as recommendations pertaining to safety by way of exercising our responsibility to our client and the public as our duty of care commitment, to mitigate or prevent hazards from arising or risks from being eliminated or mitigated or managed to reduce harm or damage, from a failure moment in full or part, from a structurally deficient or unsound tree or a tree likely to be rendered thus by its retention and subsequent deterioration from modification/s to its growing environment either existing or proposed, either above or below ground, either existing or proposed, either above or below ground, contrary to our advice.

Appendix A

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.

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.

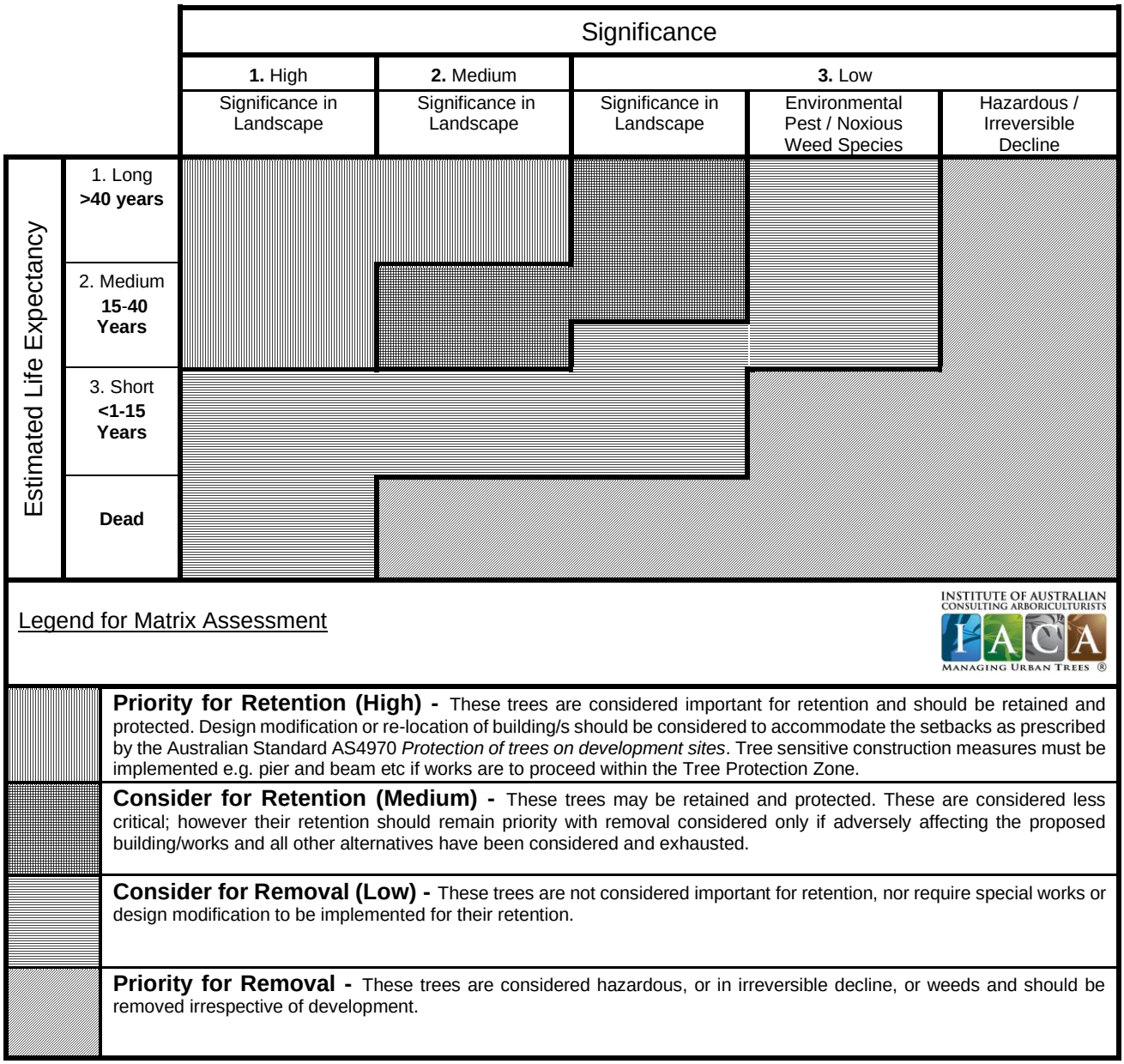
Hazardous/Irreversible Decline

- 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.



Legend for Matrix Assessment

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	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 *Protection of trees on development sites*. 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.

REFERENCES

Australia ICOMOS Inc. 1999, *The Burra Charter – The Australian ICOMOS Charter for Places of Cultural Significance*, International Council of Monuments and Sites, www.icomos.org/australia

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Appendix B

Extract from Australian Standard AS4970 2009 Protection of trees on development sites

Section 3, Determining the tree protection zones of the selected trees

3.1 Tree protection zone (TPZ)

"The tree protection zone (TPZ) is the principal means of protecting trees on development sites. The TPZ is a combination of the root area and crown area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable.

The TPZ incorporates the structural root zone (SRZ) (refer to Clause 3.3.5)."

3.2 Determining the TPZ

The radius of the TPZ is calculated for each tree by multiplying its DBH x 12.

TPZ = DBH x 12

where

DBH = trunk diameter measured at 1.4 m above ground

Radius is measured from the centre of the stem at ground level.

Appendix C

Extract from Australian Standard AS4970 2009 Protection of trees on development sites

Section 3, Determining the protection zones of the selected trees

3.3.5 Structural root zone (SRZ)

"The SRZ is the area required for tree stability. A larger area is required to maintain a viable tree. The SRZ only needs to be calculated when a major encroachment into a TPZ is proposed. Root investigation may provide more information on the extent of these roots."

Determining the SRZ

The radius of the TPZ is calculated for each tree by multiplying its DBH x 12.

SRZ radius expressed by the curve is calculated by the following formula,

$$R_{SRZ} = (D \times 50)^{0.42} \times 0.64$$

where

D = trunk diameter, in metres measured immediately above the root buttress.

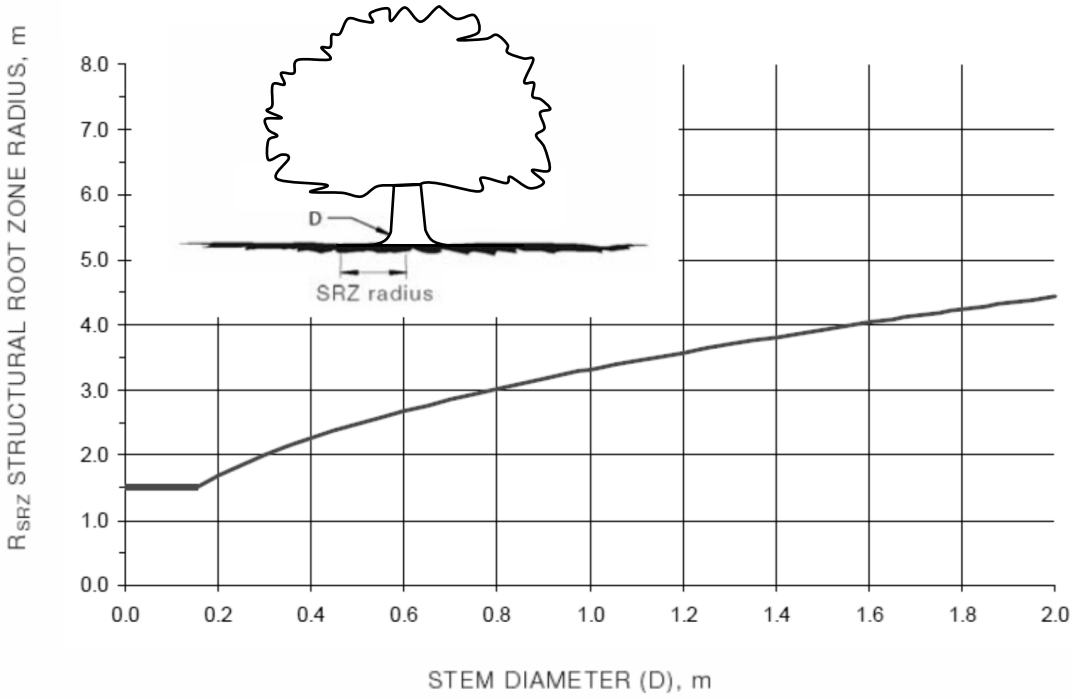


FIGURE 1 STRUCTURAL ROOT ZONE CALCULATION

(AS 4970 – 2009, Amendment No. 1 March 2010)

NOTES:

1 R_{SRZ} is the calculated structural root zone radius (SRZ radius).

2 D is the stem diameter measured immediately above root buttress.

3 The R_{SRZ} for trees less than 0.15 m diameter is 1.5 m.

4 The R_{SRZ} formula and graph do not apply to palms, other monocots, cycads and tree ferns.

5 This does not apply to trees with an asymmetrical root plate.

Appendix D

Matrix - Sustainable Retention Index Value (SRIV) ©

Version 4, 2010
Developed by IACA – Institute of Australian Consulting Arboriculturists www.iaca.org.au

The matrix is to be used with the value classes defined in the Glossary for Age / Vigour / Condition.
An index value is given to each category where ten (10) is the highest value.

Age Class	Vigour Class and Condition Class					
	Good Vigour & Good Condition (GVG)	Good Vigour & Fair Condition (GVF)	Good Vigour & Poor Condition (GVP)	Low Vigour & Good Condition (LVG)	Low Vigour & Fair Condition (LVF)	Low Vigour & Poor Condition (LVP)
	Able to be retained if sufficient space available above and below ground for future growth. No remedial work or improvement to growing environment required. May be subject to high vigour. Retention potential - Medium – Long Term.	Able to be retained if sufficient space available above and below ground for future growth. Remedial work may be required or improvement to growing environment may assist. Retention potential - Medium Term. Potential for longer with remediation or favourable environmental conditions.	Able to be retained if sufficient space available above and below ground for future growth. Remedial work unlikely to assist condition, improvement to growing environment may assist. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. No remedial work required, but improvement to growing environment may assist vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment may assist condition and vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	Unlikely to be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment unlikely to assist condition or vigour. Retention potential - Likely to be removed immediately or retained for Short Term. Potential for longer with remediation or favourable environmental conditions.
(Y) Young	**YGVG - 9** **Index Value 9** Retention potential - Long Term. Likely to provide minimal contribution to local amenity if height <5 m. High potential for future growth and adaptability. Retain, move or replace.	**YGVF - 8** **Index Value 8** Retention potential - Short – Medium Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Medium-high potential for future growth and adaptability. Retain, move or replace.	**YGVP - 5** **Index Value 5** Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Low-medium potential for future growth and adaptability. Retain, move or replace.	**YLVG - 4** **Index Value 4** Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Medium potential for future growth and adaptability. Retain, move or replace.	**YLVF - 3** **Index Value 3** Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5m. Low-medium potential for future growth and adaptability. Retain, move or replace.	**YLVP - 1** **Index Value 1** Retention potential - Likely to be removed immediately or retained for Short Term. Likely to provide minimal contribution to local amenity if height <5 m. Low potential for future growth and adaptability.
(M) Mature	**MGVG - 10** **Index Value 10** Retention potential - Medium - Long Term.	**MGVF - 9** **Index Value 9** Retention potential - Medium Term. Potential for longer with improved growing conditions.	**MGVP - 6** **Index Value 6** Retention potential - Short Term. Potential for longer with improved growing conditions.	**MLVG - 5** **Index Value 5** Retention potential - Short Term. Potential for longer with improved growing conditions.	**MLVF - 4** **Index Value 4** Retention potential - Short Term. Potential for longer with improved growing conditions.	**MLVP - 2** **Index Value 2** Retention potential - Likely to be removed immediately or retained for Short Term.
(O) Over-mature	**OGVG - 6** **Index Value 6** Retention potential - Medium - Long Term.	**OGVF - 5** **Index Value 5** Retention potential - Medium Term.	**OGVP - 4** **Index Value 4** Retention potential - Short Term.	**OLVG - 3** **Index Value 3** Retention potential - Short Term. Potential for longer with improved growing conditions.	**OLVF - 2** **Index Value 2** Retention potential - Short Term.	**OLVP - 0** **Index Value 0** Retention potential - Likely to be removed immediately or retained for Short Term.

Appendix E

Glossary

From
Dictionary for Managing Trees in Urban Environments
Institute of Australian Consulting Arboriculturists (IACA) 2009.

Vigour

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 categorized as *Normal Vigour, High Vigour*, *Low Vigour* and *Dormant Tree Vigour*.

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 a stringent watering and fertilising program; or some trees may achieve an extended lifespan from continuous *pollarding* practices over the life of the tree.

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.

Dormant Tree Vigour Determined by existing turgidity in lowest 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.

Age of Trees

Age Most trees have a stable biomass for the major proportion of their life. The estimation of the age of a tree is based on the knowledge of the expected lifespan of the taxa in situ divided into three distinct stages of measurable biomass, when the exact age of the tree from its date of cultivation or planting is unknown and can be categorized as *Young*, *Mature* and *Over-mature* (British Standards 1991, p. 13, Harris *et al*, 2004, p. 262).

Young Tree aged less than <20% of life expectancy, *in situ*.

Mature Tree aged 20-80% of life expectancy, *in situ*.

Over-mature Tree aged greater than >80% of life expectancy, *in situ,* or *senescent* with or without reduced *vigour*, and declining gradually or rapidly but irreversibly to death.

Periods of Time

Periods of Time The life span of a tree in the urban environment may often be reduced by the influences of encroachment and the dynamics of the environment and can be categorized as *Immediate*, *Short Term*, *Medium Term* and *Long Term*.

Immediate An *episode* or occurrence, likely to happen within a twenty-four (24) hour period, e.g. tree failure or collapse in full or part posing an imminent danger.

Short Term A period of time less than <1 – 15 years.

Medium Term A period of time 15 – 40 years.

Long Term A period of time greater than >40 years.

Trunk

Trunk A single stem extending from the *root crown* to support or elevate the *crown*, terminating where it divides into separate *stems* forming *first order branches*. A trunk may be evident at or near ground or be absent in *acaulescent* trees of *deliquescent* habit, or may be continuous in trees of *excurrent* habit. The trunk of any *caulescent* tree can be divided vertically into three (3) sections and can be categorized as *Lower Trunk*, *Mid Trunk* and *Upper Trunk*. For a *leaning* tree these may be divided evenly into sections of one third along the trunk.

Acaulescent A *trunkless* tree or tree growth forming a very short *trunk*. See also *Caulescent.*

Caulescent Tree grows to form a *trunk*. See also *Acaulescent*.

Condition of Trees

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^{st}) and possibly second (2^{nd}) 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 categorized as *Good Condition*, *Fair Condition*, *Poor Condition* and *Dead*.

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.

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.

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..

Dead Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms;
Processes
Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves);
Osmosis (the ability of the root 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*);
Symptoms
Permanent leaf loss;
Permanent 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 sapwood).

Removed No longer present, or tree not able to be located or having been cut down and retained on a site, or having been taken away from a site prior to site inspection.

Leaning Trees

Leaning A tree where the *trunk* grows or moves away from upright. A lean may occur anywhere along the *trunk* influenced by a number of contributing factors e.g. genetically predetermined characteristics, competition for space or light, prevailing winds, aspect, slope, or other factors. A *leaning* tree may maintain a *static lean* or display an increasingly *progressive lean* over time and may be hazardous and prone to *failure* and *collapse*. The degrees of leaning can be categorized as *Slightly Leaning*, *Moderately Leaning*, *Severely Leaning* and *Critically Leaning*.

Slightly Leaning A leaning tree where the trunk is growing at an angle within 0^{O}-15^{O} from upright.

Moderately Leaning A leaning tree where the trunk is growing at an angle within 15^{O}-30^{O} from upright.

Severely Leaning A leaning tree where the trunk is growing at an angle within 30^{O}-45^{O} from upright.

Critically Leaning A leaning tree where the trunk is growing at an angle greater than $>45^{O}$ from upright.

Progressively Leaning A tree where the degree of *leaning* appears to be increasing over time.

Static Leaning A leaning tree whose lean appears to have stabilized over time.

Form of Trees

Crown Form The shape of the crown of a tree as influenced by the availability or restriction of space and light, or other contributing factors within its growing environment. Crown Form may be determined for tree shape and habit generally as *Dominant*, *Codominant*, *Intermediate*, *Emergent*, *Forest* and *Suppressed*. The habit and shape of a *crown* may also be considered qualitatively and can be categorized as *Good Form* or *Poor Form*.

Good Form Tree of *typical* crown shape and habit with proportions representative of the taxa considering constraints such as origin e.g. indigenous or exotic, but does not appear to have been adversely influenced in its development by environmental factors in situ such as *soil water* availability, prevailing wind, or cultural practices such as lopping and competition for space and light.

Poor Form Tree of *atypical* crown shape and habit with proportions not representative of the species considering constraints and appears to have been adversely influenced in its development by environmental factors in situ such as *soil water* availability, prevailing wind, cultural practices such as lopping and competition for space and light; causing it to be *misshapen* or disfigured by disease or vandalism.

Crown Form Codominant Crowns of trees restricted for space and light on one or more sides and receiving light primarily from above e.g. constrained by another tree/s or a building.

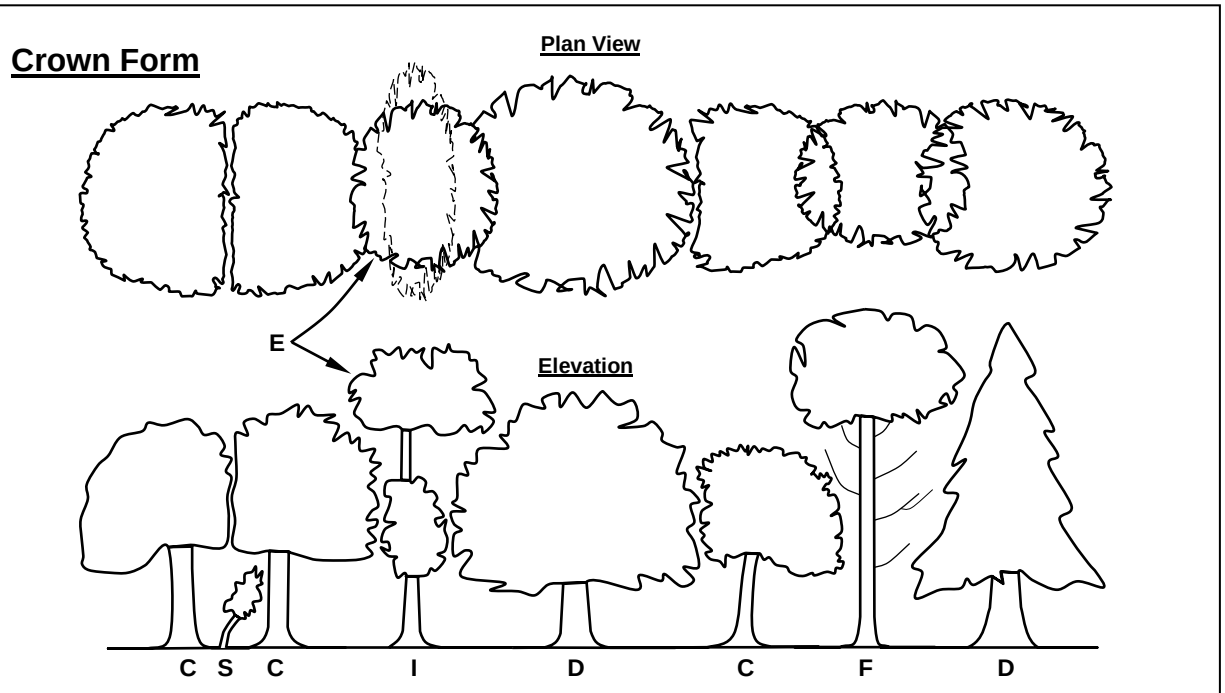
Crown Form Dominant Crowns of trees generally not restricted for space and light receiving light from above and all sides.

Crown Form Emergent Crowns of trees restricted for space on most sides receiving most light from above until the *upper crown* grows to protrude above the canopy in a stand or forest environment. Such trees may be *crown form dominant* or transitional from *crown form intermediate* to *crown form forest* asserting both *apical dominance* and *axillary dominance* once free of constraints for space and light.

Crown Form Forest Crowns of trees restricted for space and light except from above forming tall trees with narrow spreading crowns with foliage restricted generally to the top of the tree. The trunk is usually erect, straight and continuous, tapering gradually, crown often excurrent, with first order branches becoming structural, supporting the live crown concentrated towards the top of the tree, and below this point other first order branches arising radially with each *inferior* and usually temporary, divergent and ranging from horizontal to ascending, often with internodes exaggerated due to competition for space and light in the *lower crown*.

Crown Form Intermediate Crowns of trees restricted for space on most sides with light primarily from above and on some sides only.

Crown Form Suppressed Crowns of trees generally not restricted for space but restricted for light by being *overtopped* by other trees and occupying an understorey position in the canopy and growing slowly.



(Source: **D**, **C**, **I** and **S**, and Elevation, Matheny and Clark 1998, **E**, **F** and Plan View, IACA 2005)

D. Dominant, **F.** Forest, **C.** Codominant, **E.** Emergent, **I.** Intermediate, **S.** Suppressed

Symmetry

Symmetry Balance within a *crown,* or *root plate,* above or below the *axis* of the trunk of branch and foliage, and root distribution respectively and can be categorized as *Asymmetrical* and *Symmetrical*.

Asymmetrical Imbalance within a crown, where there is an uneven distribution of branches and the foliage *crown* or *root plate* around the vertical *axis* of the trunk. This may be due to *Crown Form Codominant* or *Crown From Suppressed* as a result of natural restrictions e.g. from buildings, or from competition for space and light with other trees, or from exposure to wind, or artificially caused by pruning for clearance of roads, buildings or power lines. An example of an expression of this may be, crown asymmetrical, bias to west.

Symmetrical Balance within a crown, where there is an even distribution of branches and the *foliage crown* around the vertical *axis* of the trunk. This usually applies to trees of *Crown Form Dominant* or *Crown Form Forest*. An example of an expression of this may be crown symmetrical.

Crown Spread Orientation Direction of the *axis* of *crown spread* which can be categorized as *Orientation Radial* and *Orientation Non-radial*.

Crown Spread Orientation Non-radial Where the crown extent is longer than it is wide, e.g. east/west or E/W. Further examples, north/south or N/S, and may be *Crown Form Codominant*, e.g. **A** or **B**, *Crown Form Intermediate* e.g. **A**, or *Crown Form Suppressed* e.g. **B***, and* crown symmetry is *symmetrical* e.g. **A**, or *asymmetrical* e.g. **B**.

Crown Spread Orientation Radial Where the *crown spread* is generally an even distance in all directions from the trunk and often where a tree has *Crown Form Dominant* and is *symmetrical.*

Significant Important, weighty or more than ordinary.

Significant Tree A tree considered important, weighty or more than ordinary. Example: due to prominence of location, or *in situ*, or contribution as a component of the overall landscape for *amenity* or aesthetic qualities, or *curtilage* to structures, or importance due to uniqueness of taxa for species, subspecies, variety, *crown form*, or as an historical or cultural planting, or for age, or substantial dimensions, or habit, or as *remnant vegetation*, or habitat potential, or a rare or threatened species, or uncommon in cultivation, or of aboriginal cultural importance, or is a commemorative planting.

Substantial A tree with large dimensions or proportions in relation to its place in the landscape.

Sustainable Retention Index Value (SRIV) A visual tree assessment method to determine a qualitative and numerical rating for the viability of urban trees for development sites and management purposes, based on general tree and landscape assessment criteria using classes of *age*, *condition* and *vigour*. SRIV is for the professional manager of urban trees to consider the tree *in situ* with an assumed knowledge of the *taxon* and its growing environment. It is based on the physical attributes of the tree and its response to its environment considering its position in a matrix for age class, vigour class, condition class and its sustainable retention with regard to the safety of people or damage to property. This also factors the ability to retain the tree with remedial work or beneficial modifications to its growing environment or removal and replacement. SRIV is supplementary to the decision made by a tree management professional as to whether a tree is retained or removed (IACA - Institute of Australian Consulting Arboriculturists 2005).

Diameter at Breast Height (DBH) Measurement of trunk width calculated at a given distance above ground from the base of the tree often measured at 1.4 m. The trunk of a tree is usually not a circle when viewed in cross section, due to the presence of *reaction wood* or *adaptive wood*, therefore an average diameter is determined with a *diameter tape* or by recording the trunk along its narrowest and widest axes, adding the two dimensions together and dividing them by 2 to record an average and allowing the orientation of the longest axis of the trunk to also be recorded. Where a tree is growing on a lean the distance along the top of the trunk is measured to 1.4m and the diameter then recorded from that point perpendicular to the edge of the trunk. Where a *leaning* trunk is *crooked* a vertical distance of 1.4m is measured from the ground. Where a tree branches from a trunk that is less than 1.4m above ground, the trunk diameter is recorded perpendicular to the length of the *trunk* from the point immediately below the base of the flange of the *branch collar* extending the furthest down the trunk, and the distance of this point above ground recorded as *trunk* length. Where a tree is located on sloping ground the DBH should be measured at half way along the side of the tree to average out the angle of slope. Where a tree is *acaulescent* or *trunkless* branching at or near ground an average diameter is determined by recording the radial extent of the trunk at or near ground and noting where the measurement was recorded e.g. at ground.

Crown Projection (CP) Area within the *dripline* or beneath the lateral extent of the *crown* (Geiger 2004, p. 2). See also *Crown spread* and *Dripline*.

Dripline A line formed around the edge of a tree by the lateral extent of the *crown*. Such a line may be evident on the ground with some trees when exposed soil is displaced by rain shed from the crown. See also *Crown Projection*.

Tree Protection Zone (TPZ) Area around a tree set aside to protect the trunk, roots and crown during development works. This is to protect the tree physically and a sufficient proportion of its growing environment above and below ground to assist *stability* and prolong viability. The TPZ is often delineated by an enclosed fence and established prior to demolition or construction and maintained until the completion of works. The fenced-off area around the tree is usually located at a specific distance from the trunk determined as multiples of the trunk diameter, usually *Diameter at breast height* (DBH). Special protection or construction works may provide a TPZ without a fence having been erected, e.g. a barrier formed by site sheds located on piers. Such a protection area may form an exclusion zone for all works including the temporary or permanent location of utility services. Note: Any *encroachment* into the area would require additional tree protection specifications or works in consultation with the *Project arborist*.

Encroachment 1. The growth of branches, trunk or roots onto another property. 2. Any work within a *Tree Protection Zone* other than for the maintenance of the Tree Protection Zone.

Deadwood

Deadwood Dead branches within a tree's crown and considered quantitatively as separate to *crown cover* and can be categorised as *Small Deadwood* and *Large Deadwood* according to diameter, length and subsequent *risk* potential. The amount of dead branches on a tree can be categorized as *Low Volume Deadwood*, *Medium Volume Deadwood* and *High Volume Deadwood*. See also *Dieback.*

Deadwooding Removing of dead branches by *pruning*. Such pruning may assist in the prevention of the spread of *decay* from *dieback* or for reasons of safety near an identifiable target.

Small Deadwood A dead branch up to 10mm diameter and usually <2 metres long, generally considered of low *risk* potential.

Large Deadwood A dead branch >10mm diameter and usually >2 metres long, generally considered of high *risk* potential.

Low Volume Deadwood Where <5 dead branches occur that may require *removal*.

Medium Volume Deadwood Where 5-10 dead branches occur that may require *removal*.

High Volume Deadwood High Volume Deadwood Where >10 dead branches occur that may require *removal*.

Dieback

Dieback The death of some areas of the *crown*. Symptoms are leaf drop, bare twigs, dead branches and tree death, respectively. This can be caused by root damage, root disease, bacterial or fungal canker, severe bark damage, intensive grazing by insects, *abrupt changes* in growth conditions, drought, water-logging or over-maturity. Dieback often implies reduced *resistance, stress* or *decline* which may be temporary. Dieback can be categorized as *Low Volume Dieback*, *Medium Volume Dieback* and *High Volume Dieback*.

Low Volume Dieback Where <10% of the *crown cover* has died. See also *Dieback*, *High Volume Dieback* and *Medium Volume Dieback*.

Medium Volume Dieback Where 10-50% of the *crown cover* has died.

High Volume Dieback Where >50% of the *crown cover* has died.

Epicormic shoots

Epicormic Shoots Juvenile shoots produced at branches or trunk from *epicormic strands* in some Eucalypts (Burrows 2002, pp. 111-131) or sprouts produced from dormant or latent buds concealed beneath the bark in some trees. Production can be triggered by fire, pruning, wounding, or root damage but may also be as a result of *stress* or *decline*. Epicormic shoots can be categorized as *Low Volume Epicormic Shoots*, *Medium Volume Epicormic Shoots* and *High Volume Epicormic Shoots*.

Low Volume Epicormic Shoots Where <10% of the c*rown cover* is comprised of live *epicormic shoots*.

Medium Volume Epicormic Shoots Where 10-50% of the *crown cover* is comprised of live *epicormic shoots*.

High Volume Epicormic Shoots Where >50% of the *crown cover* is comprised of live *epicormic shoots*.

Roots

First Order Roots (FOR) Initial woody roots arising from the *root crown* at the base of the *trunk*, or as an *adventitious root mass* for structural support and *stability*. Woody roots may be buttressed and divided as a marked gradation, gradually tapering and continuous or tapering rapidly at a short distance from the root crown. Depending on soil type these roots may descend initially and not be evident at the root crown, or become buried by changes in soil levels. Trees may develop 4-11 (Perry 1982, pp. 197-221), or more first order roots which may radiate from the trunk with a relatively even distribution, or be prominent on a particular aspect, dependent upon physical characteristics e.g. leaning trunk, *asymmetrical* crown; and constraints within the growing *environment* from topography e.g. slope, soil depth, rocky outcrops, exposure to predominant wind, soil moisture, depth of *water table* etc.

Orders of Roots The marked divisions between woody roots, commencing at the initial division from the base of the trunk, at the *root crown* where successive branching is generally characterised by a gradual reduction in root diameters and each gradation from the trunk and can be categorized numerically, e.g. *first order roots*, second order roots, third order roots etc. Roots may not always be evident at the *root crown* and this may be dependent on species, age class and the growing environment. Palms at maturity may form an adventitious root mass.

Root Plate The entire root system of a tree generally occupying the top 300-600mm of soil including roots at or above ground and may extend laterally for distances exceeding twice the height of the tree (Perry 1982, pp. 197-221). Development and extent is dependent on water availability, soil type, *soil depth* and the physical characteristics of the surrounding landscape.

Root Crown Roots arising at the base of a trunk.

Zone of Rapid Taper The area in the *root plate* where the diameter of *structural roots* reduces substantially over a short distance from the *trunk.* Considered to be the minimum radial distance to provide structural support and *root plate* stability. See also *Structural Root Zone (SRZ)*.

Structural Roots Roots supporting the infrastructure of the *root plate* providing strength and *stability* to the tree. Such roots may taper rapidly at short distances from the *root crown* or become large and woody as with gymnosperms and dicotyledonous angiosperms and are usually 1st and 2nd order roots, or form an *adventitious root mass* in monocotyledonous angiosperms (palms). Such roots may be crossed and grafted and are usually contained within the area of *crown projection* or extend just beyond the *dripline*.

APPENDIX F – Tree Assessment

Tree ID number	**Botanical Name**	**Age** Y: Young M: Mature OM: Overmature (senescent)	**Height** (m)	**Spread** (m)	**DBH** (mm)	**DARB** (mm)	**TPZ** (m. rad) AS 4970 (2009)	**SRZ** (m. rad) AS 4970 (2009)	**SRIV** Age, Vigour, Condition / Index Rating (see Appendix D) www.iaca.org.au / Estimated Life Expectancy 1 = Long 2 = Medium 3 = Short	**STARS** Significance scale (see Appendix A) www.iaca.org.au 1 = High 2 = Medium 3 = Low / Retention Value 1 = High 2 = Medium 3 = Low 4 = Remove	**Retain / Remove / Transplant** **pr = prune** **cr = crown** **rt = roots**	Comments and Recommendations
Tree ID number	**Botanical Name, common name**	**Age**	**Height**	**Spread**	**DBH**	**DARB**	**TPZ**	**SRZ**	**SRIV**	**STARS**	**Action**	**Comments and Recommendations**
1	*Eucalyptus largiflorens* – Black Box	M	13	North 7.7 m West 8.8 m South 10.3 m East 10.5 m	1200 x 900 DBH 1050 mm average	1050	12.0	3.4	MGVF - 9 / 1	1 / 1	**Retain**	Trunk straight to 3 m. Crown cover 80% approx. and Crown density 85% approx. High volume deadwood in mid- lower crown. Second order structural branches descending on lower crown and one in contact with ground to southwest. Burl growths on trunk from west and east at 1600 mm. Tree previously pruned with branch stubs up to 300 mm diameter evident in mid crown. Galvanised steel cable (12 mm diameter) in tree on first order structural branch (FOSB) to southwest in lower crown at 3 m. The cable is to be removed as it is constricting the stem. A flat head steel nail 2.5 mm diameter was observed protruding 60 mm from trunk adjacent the Left wound margin at 200 mm above ground and 250 mm from wound margin.
												- First order root (FOR) to NE 400 mm diameter at buttress at 300 mm above ground. Root extending at surface for 900 mm and descending. - FOR to north 300 mm diameter at buttress at edge of trunk, with a lesion at 250 mm from edge of trunk resulting in root bifurcation, extending to N and NW both 150 mm diameter and descending. - FOR to W, 300 mm diameter at root buttress, descending at 150 mm from edge of trunk.
												<u>Trunk Wound Assessment</u>
												Trunk wound, basal, to southwest extending from ground to 1500 mm and potentially to 3 m but disrupted by horizontal burl bulges causing bark to be extruded and to diverge on the upper and lower sides. Base 220 mm wide at ground. Wound occluded from 450 mm. Depth of margins, right 390 mm and left 480 mm at ground. Wound face to dead heartwood entire proximally from ground. From the extent of the wound estimated from the depth of wound margins, wound length and advanced almost occluded wound margins and the low rainfall in the area approx. 100 mm per annum and corresponding slow growth rate of the tree, slowed further after wounding, the tree is estimated 250-300 years old. The wounding event is estimated to have occurred approx. 120-150 years ago and causation is highly likely to be of Aboriginal cultural origin, particularly in the trees location close to the Darling River.

APPENDIX – **G**, Tree Location Plan, 1 of 3
(tree/s numbered per Appendix F - Tree Assessment)

Lots 2, 3 & 4 DP1201089 & Lot 111 DP 1201028, Bonney Street, Wilcannia NSW, Ref: 23037, 5/03/2021.

Prepared by Urban Tree Management Australia P/L, 65 Excelsior Street, Merrylands NSW 2160, tel. 02 9760 1389.

From Detail Survey at Bonney Street, Wilcannia for Proposed Medical Clinic, Scale 1:400 @ A2, Reference T19-8D, date 13/02/2020 prepared by Graham F. Howe Registered surveyor, 515 Wyman Lane, Broken Hill NSW 2880, t. 08 8087 3660.

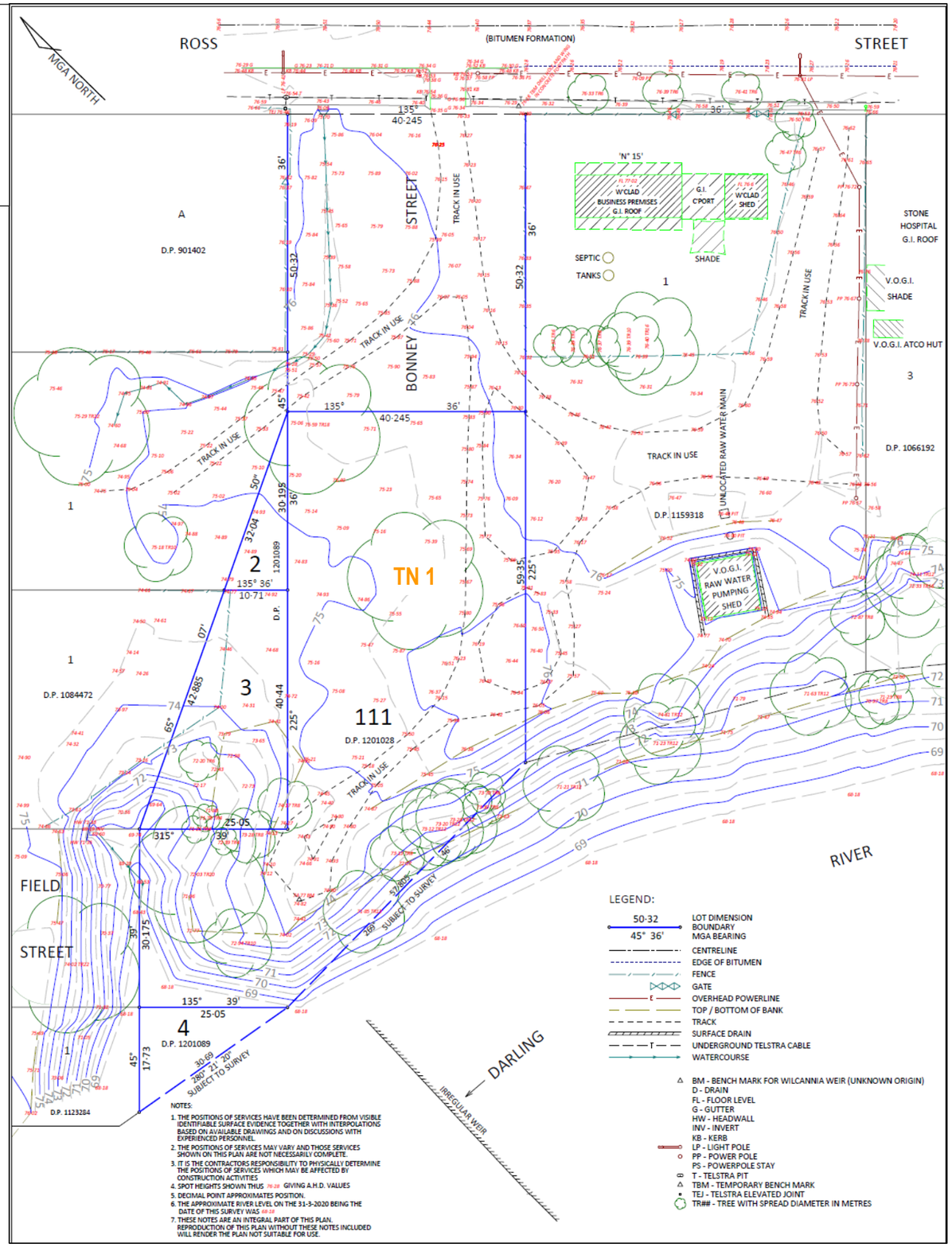
Legend

TN 10. Tree/s or stands of trees numbered in orange and bold or surrounded by an unbroken line are recommended for retention.

TN 11. Tree/s or stands of trees numbered in **blue and not bold** or surrounded by a broken line are recommended for **removal**.

Note: trees indicated, unnumbered are either shrubs, or trees of species, or dimensions, or condition class not protected by the Tree Preservation Order or trees not affected by the proposed works or were already removed.

URBAN TREE MANAGEMENT



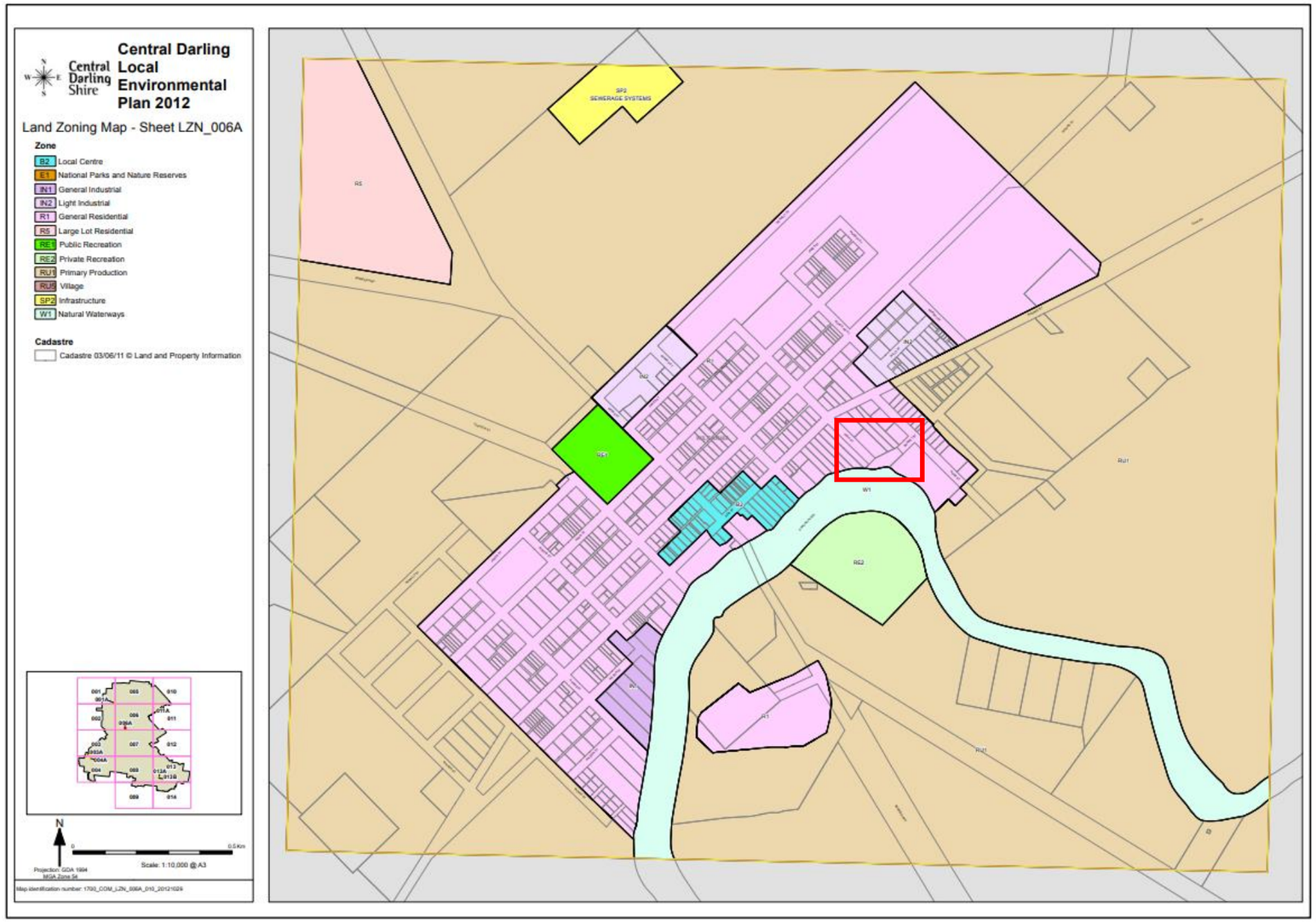
Appendix G – Tree Location Plan, Land Zoning Map, 2 of 3

Lots 2, 3 & 4 DP1201089 & Lot 111 DP 1201028, Bonney Street, Wilcannia NSW, Ref: 23037, 5/03/2021.

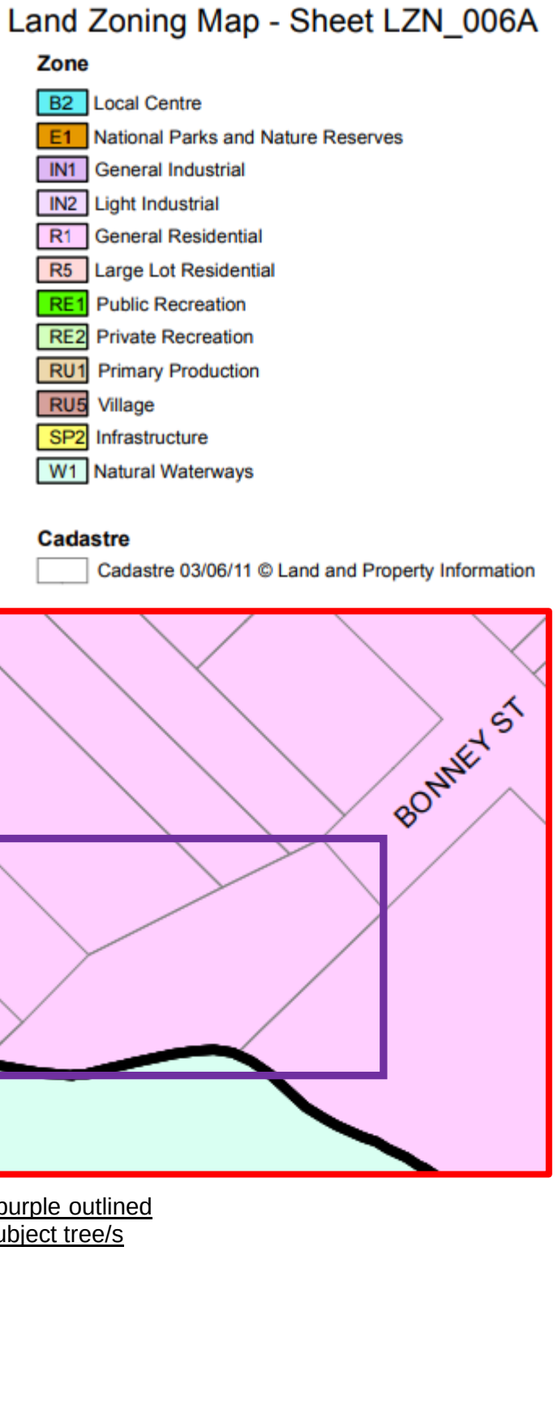
Prepared by Urban Tree Management Australia P/L, 65 Excelsior Street, Merrylands NSW 2160, tel. 02 9760 1389.

From NSW Legislation, Central Darling Local Environmental Plan 2012 (2013 EPI 33), Land Zoning Map – Sheet LZN_006A.

URBAN TREE MANAGEMENT



Land Zoning Map – Highlighted red section showing location of subject tree/s in R1 area (see Inset Plan)



Inset Land Zoning Map – purple outlined area showing location of subject tree/s

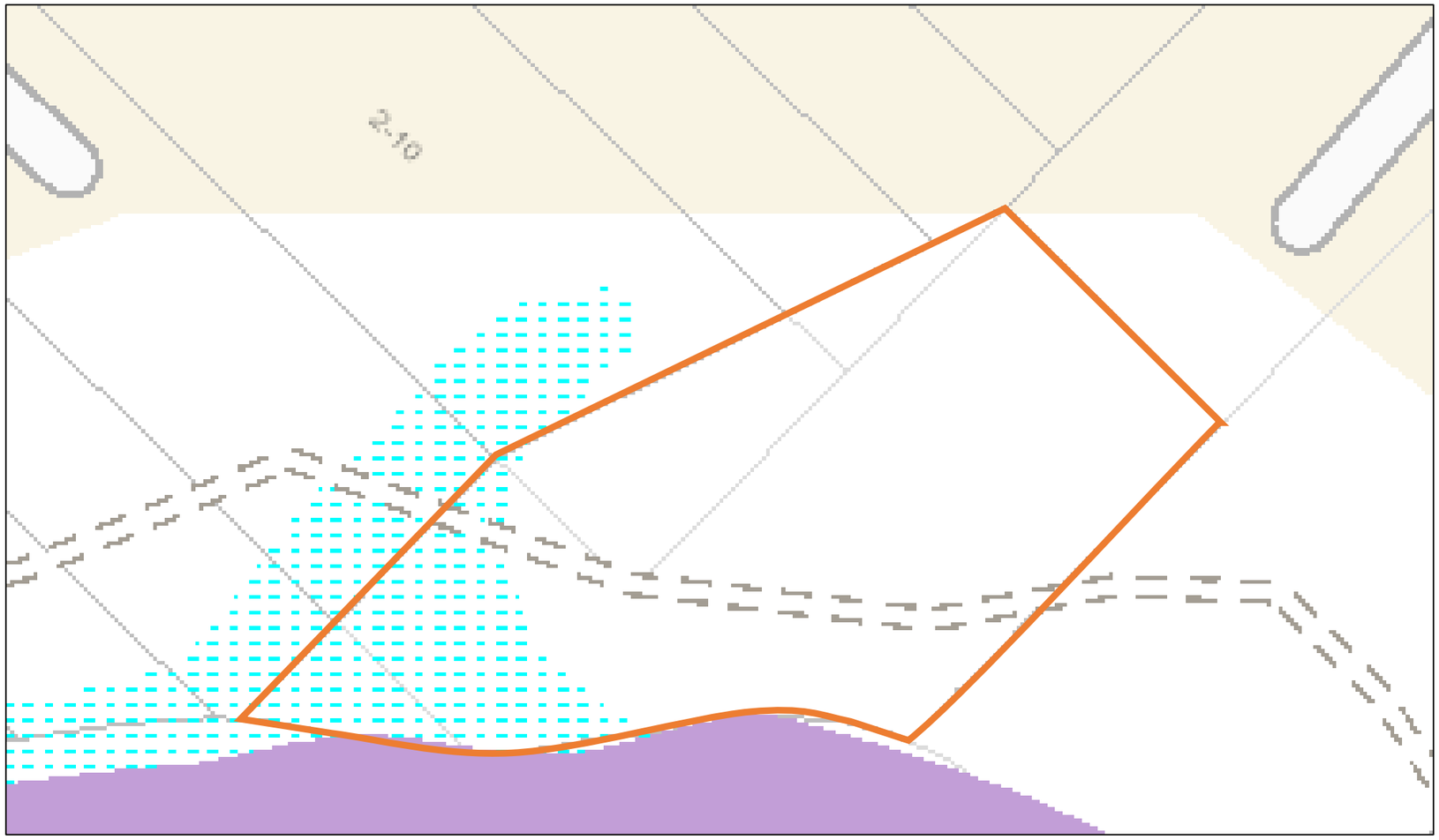
Appendix G – Tree Location Plan, Biodiversity Values Map, 3 of 3

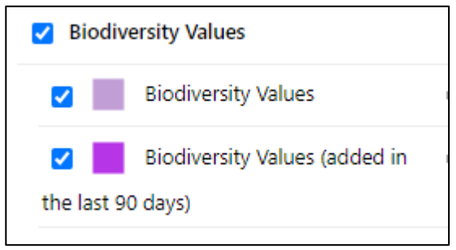
Lots 2, 3 & 4 DP1201089 & Lot 111 DP 1201028, Bonney Street, Wilcannia NSW, Ref: 23037, 5/03/2021.

Prepared by Urban Tree Management Australia P/L, 65 Excelsior Street, Merrylands NSW 2160, tel. 02 9760 1389.

From NSW Government, DPIE, Biodiversity Values Map and Threshold Tool.

URBAN TREE MANAGEMENT





Biodiversity Values Map – orange outlined area showing location of subject tree/s

APPENDIX H – TREE PROTECTION PLAN 1 of 4 - Tree Protection Zones - Standard Procedure

The Protective fencing where required may delineate the ***TPZ*** and should be located as determined by the project arborist in accordance with AS4970 *Protection of trees on development sites*, Section 4, 4.3. *"Fencing should be erected before any machinery or materials are brought onto the site and before the commencement of works including demolition. Once erected, protective fencing must not be removed or altered without approval by the project arborist. The TPZ must be secured to restrict access. AS4687 Temporary fencing and hoardings 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. Fence posts and supports should have a diameter greater than 20 mm and be located clear of roots. Existing perimeter fencing and other structures may be suitable as part of the protective fencing."*

AS4970 Section 4, Tree protection measures, Figure 3 Protective fencing shows examples of such fencing.

"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. The 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. "

AS4970 Section 4, Tree protection measures, 4.2 Activities restricted within the TPZ
"Activities generally excluded from the TPZ included but are not limited to-
(a) Machine excavation including trenching;
(b) Excavation for silt fencing;
(c) cultivation;
(d) storage;
(e) preparation of chemicals, including preparation of cement products;
(f) parking of vehicles and plant;
(g) refuelling;
(h) dumping of waste;
(i) wash down and cleaning of equipment;
(j) placement of fill;
(k) lighting of fires;
(l) soil level changes;
(m) temporary or permanent installation of utilities and signs, and
(n) physical damage to the tree."

Tree Protection signage is to be attached to each ***Tree Protection Zone*** and displayed from within the development site in accordance with AS4970 2009 *Protection of trees on development sites*, Section 4.4 and example Figure C1 (as shown) and lettering to comply with AS1319.

Where a tree is to be retained and a ***Tree Protection Zone*** cannot be adequately established due to restricted access e.g. tree located along side an access way, the trunk and branches in the lower crown will be protected by wrapping 2 layers of hessian or carpet underfelt around the trunk and branches for a minimum of 2 m or as lower branches permit, then wire or rope secures 75x50x2000 mm hardwood battens together around the trunk (do not nail or screw to the trunk or branches). The number of battens to be used is as required to encircle the trunk and the battens are to extend to the base of the tree (AS4970 2009 *Protection of trees on development sites*, Figure 4 Examples of Trunk, Branch and ground protection).

Trunk/Branch and root protection If a tree is growing down slope from an excavation, a silt fence located along the contours of the site in the area immediately above the ***Tree Protection Zone*** fencing may need to be installed and regularly maintained to prevent burial and asphyxiation of the roots of the tree. To allow for the maintenance of both fences, the silt fence must be constructed separately to the tree protection fence and the 2 fences must be constructed independently of each other and standalone. To reduce competition with the tree the area within the ***Tree Protection Zone*** is to be kept free of weeds. These are best removed by the application of foliar herbicide with Glyphosate as the active constituent. This is the preferred method rather than removal by cultivation of the soil within the dripline, to minimise root disturbance to the tree. The removal of woody weeds such as Privet should use the cut and paint method of herbicide application. Weeds to be controlled within the ***Tree Protection Zone***, for the duration of the project.

The area of the Tree Protection Zone to be mulched to a depth of 100 mm with organic material being 75% leaf litter and 25% wood, and this being composted material preferably from the same genus and species of tree as that to where the mulch is to be applied, i.e. species specific mulch. The depth of mulch and type as indicated, to be maintained for the duration of the project. Where deep excavation will expose the soil profile to drying out the root plate is to be protected by pegging jute matting across the ground surface 2 m back from the edge of the profile and 2 m down the face of the profile and is to be in one continuous sheet or layers up to 5 mm thick and overlapped 300 mm and pegged. Pegs are to be a minimum length of 200 mm and spaced at 500 mm increments in a grid pattern. Once installed mulch is to be placed on top of the jute matting previously described.

No services either temporary or permanent are to be located within the ***Tree Protection Zone***. If services are to be located within the ***Tree Protection Zone***, special details will need to be provided by the Project Arborist for the protection of the tree regarding the location of the service/s.

A tree will not be fertilised during its protection within the ***Tree Protection Zone***, as this may hasten its decline if it were to decline. If a tree is to be fertilised this should be in consultation with the Project Arborist as per AS4970 (2009).

In the event of prolonged dry periods, or where a tree has been transplanted, or where excavation nearby, especially up slope, leads to drying out of a soil profile, or modification to ground water flow, or flows across an existing ground surface to the tree and its growing environment; deep root watering thoroughly at least twice a week is to be undertaken to irrigate the tree. The need for such watering is determined readily by observing the dryness of the soil surface within the dripline of the tree by scraping back some mulch. Mulch is to be reinstated afterwards. In the event of disrupted ground or surface water flows to the tree due to excavation, filling or construction, a reticulated irrigation system may be required to be installed within the ***Tree Protection Zone***. If an irrigation system is to be installed, consideration must be given to volume, frequency, and drainage of water delivered, and this should be in consultation with the Project Arborist as per AS4970 (2009).

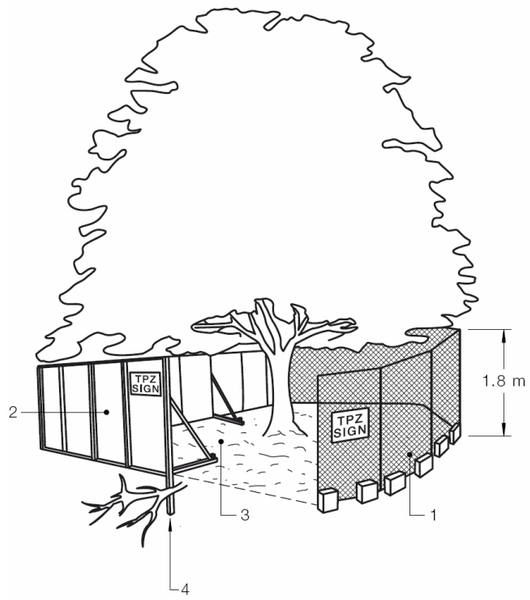


FIGURE 3 PROTECTIVE FENCING

FIGURE C1 TREE PROTECTION ZONE SIGN

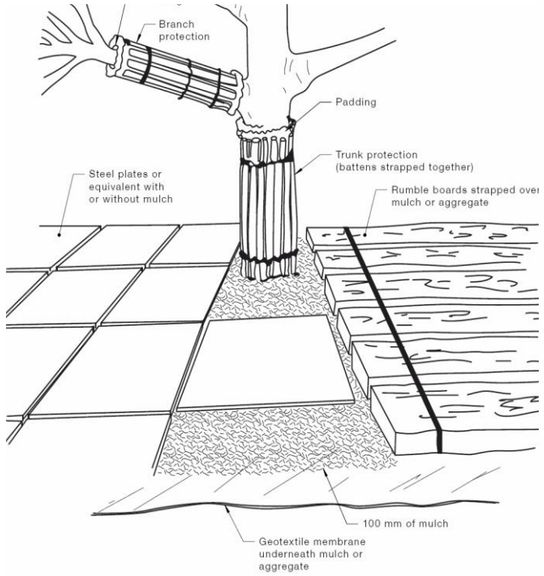
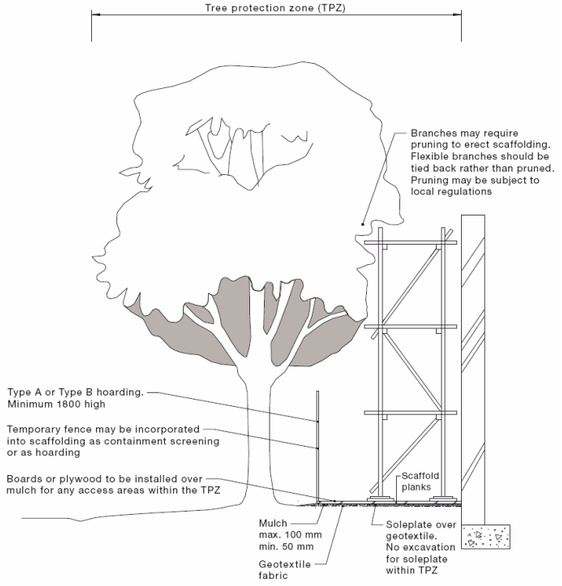


FIGURE 4 EXAMPLES OF TRUNK, BRANCH AND GROUND PROTECTION



NOTE: Excavation required for the insertion of support posts for tree protection fencing should not involve the severance of any roots greater than 20 mm in diameter, without the prior approval of the project arborist.

FIGURE 5 INDICATIVE SCAFFOLDING WITHIN A TPZ

Scaffolding *"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 minimized. This can be achieved by designing scaffolding to avoid branches or tying back branches. Where pruning is unavoidable it must be specified by the project arborist in accordance with AS4373. Ground below the scaffolding should be protected by boarding (e.g. scaffolding board or plywood sheeting) as shown in Figure 5. Where access is required, a board walk or other surface material should be installed to minimise soil compaction. Boarding should be placed over a layer of mulch and impervious sheeting to prevent soil contamination. The boarding should be left in place until the scaffolding is removed."* (Standards Australia 2009, p. 18).

APPENDIX H – Tree Protection Plan, 2 of 4
(trees numbered per Appendix F - Tree Assessment)
Lots 2, 3 & 4 DP1201089 & Lot 111 DP 1201028, Bonney Street, Wilcannia NSW, Ref: 23037, 5/03/2021.

Prepared by Urban Tree Management Australia P/L, 65 Excelsior Street, Merrylands NSW 2160, tel. 02 9760 1389.

URBAN TREE MANAGEMENT

Tree Protection Works - General

All retained tree/s Existing levels are to be preserved and no excavation except by hand to protect structural roots is to be undertaken within the Tree Protection Zone/s. No cutting or filling is to be undertaken within any TPZ unless specified by the Project Arborist.

Induction for Tree Protection All workers entering the site involved in construction must be advised of the tree protection measures and specifications outlined within this report during the site induction. This is to be verbally acknowledged and signed off before commencement of work.

Tree Protection Works - Specific

Prior to Demolition

Pruning – Tree 1 Pruning is required for clearance for safe working access and to remove some deadwood and is to be to be conducted per AS4973(2007) with the pruning categories detailed under *Crown Maintenance* and *Crown Modification*. Crown projection was measured 7.7 m to North, 8.8 m to West, 10.3 m to South and 10.5 m to East. Pruning to provide 7 m clearance from centre of trunk to the *Nerve Centre* and *Keeping Well* buildings while maintaining the shape and integrity of the tree.

Galvanised steel cable (12 mm diameter) in tree on first order structural branch (FOSB) to southwest in lower crown at 3 m. Cable to be removed as is constricting stem.

Crown Maintenance - AS4373(2007) Sec. 7, 7.2.2 and 7.2.4

Deadwooding – *"Deadwooding is the removal of dead branches. The minimum diameter and location of branches to be removed shall be specified."*

Dead branches up to 300 mm diameter are to be removed from over paths and buildings for reasons of safety. However hollow branches that may provide fauna habitat are to be retained or shortened to prevent collapse while retaining their habitat potential.

Selective Pruning - *"Selective pruning may be used to remove identified branches that are causing a specific problem. These branches will be specified at the time of assessment*."

Pruning may include branches up to 400 mm diameter and may remove 10% approximately of the live crown. Branches are to be pruned from descending and restricting access to paths and for clearance from over buildings. However hollow branches that may provide fauna habitat are to be retained or shortened to prevent collapse while retaining their habitat potential.

Crown Modification - AS4373(2007) Sec. 7, 7.3

Reduction pruning – *"For reduction pruning the ends of branches are removed to internal branches or stems. The extent of crown cover or limb reduction shall be specified at the time of assessment."*

Pruning may include branches up to 400 mm diameter and may remove 15 – 20% approximately of the live crown. Branches are to be pruned from descending and restricting access to paths and for clearance from over buildings. However hollow branches that may provide fauna habitat are to be retained or shortened to prevent collapse while retaining their habitat potential.

Note: All branches to be pruned are to be checked on site before works begin. As works progress some additional branches may require pruning due to them having been obscured by foliage and other branches at the time of assessment, or pruning, breakages or movement since. Conversely, as works progress some branches may not require pruning or may require less pruning due to the recoil of pruned or crossed branches providing movement and desired clearances.

TPZ Fencing or works Tree/s 1 Post tree pruning this tree is to be enclosed within a Tree Protection Zone and maintained and retained until the completion of all building works. This is to be installed as shown in Appendix H – Tree Protection Plan - Tree Protection Zone - Standard Procedure, Plan 1 of 4. Tree Protection zone signage is to be applied to the fence per Plan 1 of 4 Figure C1.

Trunk and Branch protection As per AS4970 (2009) Protection of trees on development sites, Section 4 Tree protection measures, 4.5.2 Trunk and branch protection, the trunk, column root to the north of the trunk and branches to 4 m are to be protected from possible damage from collision with trucks or plant equipment and are to be wrapped with 4 layers of hessian or a single layer of carpet underfelt around the subject stems for a minimum of 4 m and extending to first order branches, then wire or rope is to be used to secure 75x50x2000 mm hardwood battens to the trunk (do not nail or screw to the trunk). The number of battens to be used is as required to encircle the trunk and the battens are to extend to the base of the tree as per AS4970 (2009) Figure 4, (see Appendix G, Plan 1 of 4).

Scaffolding within the Tree Protection Zone or any protected tree Not required as retained tree protected at sufficient distances to not be impacted by scaffolding.

Mulching Mulch with aged leaf litter is required within the TPZ of this tree to a minimum depth of 50-100 mm and is to be maintained and kept weed free for the duration of works on the site.

Any plant equipment is to work from outside of the TPZ reaching into the TPZ to minimise damage to overhanging branches and to protect roots.

All exiting soil levels within the TPZ fenced area are to be retained unaltered to protect tree roots.

During Demolition and Earth Works

Crown Protection – Tree 1 Plant equipment is to be kept away from the crown of this tree and work is to be conducted from outside of the TPZ reaching into the TPZ to minimise soil disturbance and compaction and branch and trunk damage.

Root Protection – Tree 1 No work is to be undertaken within the TPZ. Where access is required within the TPZ, roots are to be protected from soil compaction by the application of ground protection as per AS4970 (2009) section 4, 4.5.3 Ground Protection, where a permeable membrane such as geotextile fabric is to be located at existing ground level beneath a layer of mulch or crushed rock with no fines 100 mm deep and covered with rumble boards or steel plates as per AS4970 (2009) Figure 4, (see Appendix G, Plan 1 of 4). Plant equipment is to work from outside of the TPZ reaching into the TPZ to minimise soil disturbance and compaction, this to include building footings, piers and pavement.

TPZ Fencing or works Tree 1 Tree Protection Zone fences and works are to remain in place during this part of the project.

APPENDIX H – Tree Protection Plan, 3 of 4
(trees numbered per Appendix F - Tree Assessment)
Lots 2, 3 & 4 DP1201089 & Lot 111 DP 1201028, Bonney Street, Wilcannia NSW, Ref: 23037, 5/03/2021.

Prepared by Urban Tree Management Australia P/L, 65 Excelsior Street, Merrylands NSW 2160, tel. 02 9760 1389.

URBAN TREE MANAGEMENT

During Construction

Crown Protection – Tree 1 Plant equipment is to be kept away from the crown of this tree and work is to be conducted from outside of the TPZ reaching into the TPZ to minimise soil disturbance and compaction and branch and trunk damage.

Root Protection – Tree 1 No work is to be undertaken within the TPZ. Where access is required within the TPZ, roots are to be protected from soil compaction by the application of ground protection as per AS4970 (2009) section 4, 4.5.3 Ground Protection, where a permeable membrane such as geotextile fabric is to be located at existing ground level beneath a layer of mulch or crushed rock with no fines 100 mm deep and covered with rumble boards or steel plates as per AS4970 (2009) Figure 4, (see Appendix G, Plan 1 of 4). Plant equipment is to work from outside of the TPZ reaching into the TPZ to minimise soil disturbance and compaction this to include building footings, piers and pavement.

Pier footings with the TPZ - Piers for buildings and walkway ramps are to be located in hand excavated holes to 600 mm deep to determine the presence of structural roots (root greater than >40 mm diameter). The design is to have sufficient flexibility to allow a pier to be relocated 100 mm from the edge of a structural root. After excavation to 600 mm and where no structural root is encountered a pier can be excavated mechanically to the required depth with the plant equipment reaching into the TPZ to continue excavation with the auger. Waste soil is to be removed away from the TPZ.

TPZ Fencing or works Tree 1 Tree Protection Zone fences and works are to remain in place during this part of the project.

Root Protection from Soil Profile Desiccation - utility trenches – all protected Trees Where an excavation profile is to be open for 1 day or more the exposed structural roots (roots >400 mm diameter) and those within the soil profile are to be protected drying out. The exposed structural roots are to be wrapped with a triple layer of hessian which is to be fastened to itself with hessian to prevent unraveling. The soil profile to 2 m deep (or to the base of the excavation if less than 2 m) is to be achieved by applying a double layer of hessian fabric to cover the exposed soil profile from grade within the Tree Protection Zone of these trees and fixed into place by metal pegs at the bottom, and the fabric is to overlap the ground at surface by 300 mm and be pegged into place with metal pegs. The soil profile protection is to remain in place and be maintained until backfilling is completed.

Location of underground utilities within a Tree Protection Zone – All retained tree/s All underground utilities and any stormwater are to be located away from the TPZ. Utility services should not be located within the Tree Protection Zone. Any utility services to be located underground within the TPZ are to be undertaken utilising excavation techniques that prevent or minimise damage to structural roots (roots greater than >40 mm diameter). Such works should be conducted with non-motorised hand tools of with an air knife or water knife and vacuum truck or with directional drilling with minimum depth to top of bore of 600 mm, to prevent soil compaction and root damage and works are to be monitored and certified by the Project Arborist.

Precautions in respect to temporary work – All retained tree/s If pedestrian or vehicular access is required within a Tree Protection Zone the roots of the tree are to be protected from soil compaction by the application of ground protection as per AS4970 (2009) Figure 4, (see Appendix H, Plan 1 of 4), where a permeable membrane such as geotextile fabric is to be located at existing ground level beneath a layer of mulch or crushed rock with no fines 100 mm deep and covered with rumble boards or steel plates. Such works are to be monitored and certified by the Project Arborist. Any plant equipment is to work from outside of the TPZ reaching into the TPZ to minimise soil disturbance and compaction. The ground protection works are to remain in place until building works are completed. Maintain tree protection, waste material is to be kept clear of the TPZ.

Backfilling within a Tree Protection Zone Not to be undertaken within the Tree Protection Zone.

***Excavation and construction of path*s** A path section within the Tree Protection Zone is to be hand excavated to the depth of the path footing along the line of path closest to the tree to determine the presence of any structural roots. Roots requiring pruning are to be pruned per *Root Pruning* below. Any plant equipment is to work from outside of the TPZ reaching into the TPZ to minimise damage to overhanging branches and to protect roots from soil compaction of crushing of woody roots near the surface.

Root Pruning Were required, root pruning is to be conducted in accordance with (AS4373, 2007, p. 18) sec. 9 *Root Pruning,* Cuts are to be made with clean sharp tools with final cuts made to undamaged tissue. Final cuts should be made perpendicular to the length of the root with a final cut to undamaged tissue to remove injured or crushed tissues allowing the tree to develop strong internal boundaries and generate new roots (Shigo 1989, p. 199).

Post Construction and Landscaping

Remove Tree Protection Zone works.

Remedial pruning to crown of tree as required to be conducted per AS4373 (2007).

Excavated Garden Beds – Tree 1 No excavated garden beds are to be constructed within the TPZ.

Excavation for landscape plantings within the Tree Protection Zones This should be undertaken manually, to prevent damage to structural roots or loss of fine roots. Existing soil grades should be maintained with plant container size restricted to a maximum size of 5 litres. No more than 2 plants per square metre for 5 litre and 5 plants per square metre for 150 mm pot size.

Maintain crown protection.

Waste material is to be kept clear of the TPZ

APPENDIX H – Tree Protection Plan, 4 of 4

(trees numbered per Appendix F - Tree Assessment)

Lots 2, 3 & 4 DP1201089 & Lot 111 DP 1201028, Bonney Street, Wilcannia NSW, Ref: 23037, 5/03/2021.

Prepared by Urban Tree Management Australia P/L, 65 Excelsior Street, Merrylands NSW 2160, tel. 02 9760 1389.

From Roof Plan (further reduced), Job No.: 480, Scale 1:200 @ A3, Dwg No.: 02, prepared by Troppo Architects 28 East Terrace, Adelaide, South Australia 5000, t. +61 8 8232 9696.

URBAN TREE MANAGEMENT

Legend

TN 9 Trees numbered in blue and not bold are recommended for retention.

TN 10 Trees numbered in orange and bold are recommended for retention.

Tree Protection Zone (TPZ), setbacks as indicated, or other protection measures or works as indicated.

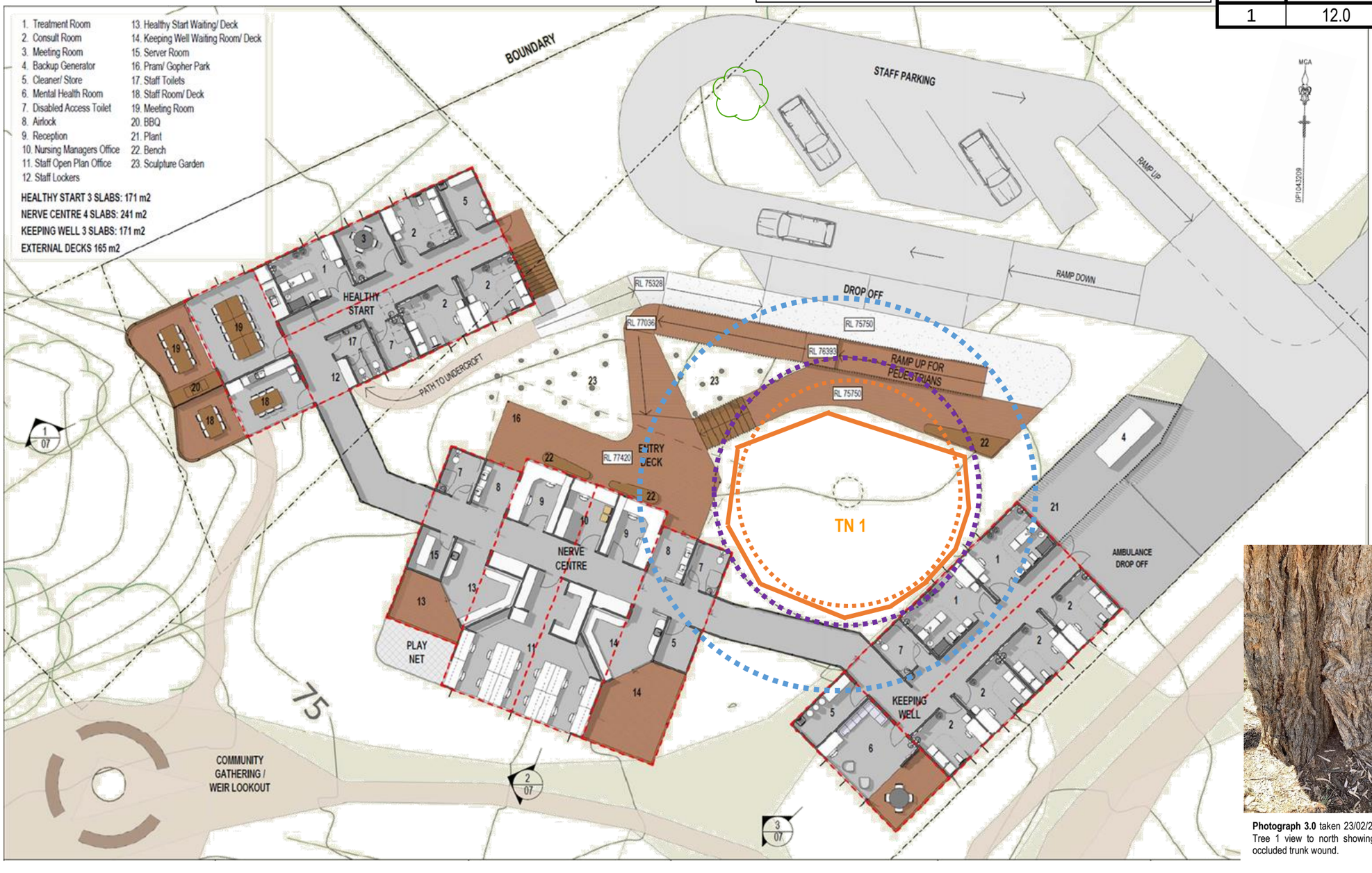
Tree Protection Zone Fence.

Tree Protection Zone (TPZ).

Structural Root Zone (SRZ).

Tree Protection Zone setbacks

1. UTM Tree No. / UTM Stand No.	2. Tree Protection Zone (TPZ) = **12 x DBH** (m) From center of trunk (COT) in metres AS4970 (2009) Section 3 (see Appendix B)	3. Structural Root Zone **SRZ** From center of trunk (COT), trunk diameter above root buttress (DARB) AS4970 (2009) Section 3, 3.3.5 (see Appendix C) where applicable (m)	4. Distance of fence with TPZ setback **reduced by 10%** of area on one side of tree only, in metres equating to approx. 0.3 radius as per AS4970 (2009) Section 3, 3.3 (mm)	5. Proposed distance of works on the side closest to excavation / building construction in metres From center of trunk (COT), (m)
1	12.0	3.5	8.82	8.0



Photograph 1.0 taken 23/02/2021 by D Draper, Tree 1 view to west

Photograph 2.0 taken 23/02/2021 by D Draper, Tree 1 view to north showing trunk burls.

Photograph 3.0 taken 23/02/2021 by D Draper, Tree 1 view to north showing base of almost occluded trunk wound.

Photograph 4.0 taken 23/02/2021 by D Draper, Tree 1 view to northeast showing old pruning stubs in mid crown.