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Software Solutions for Tree Inventory Management

Arboricultural Impact Assessment

NSW Department of Education
Parramatta East Public School
30-32 Brabyn Street, Parramatta NSW

5 March 2025

Assessment and report by:

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Job No: 03110v6

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03110v6

5 March 2025

Matt Rheuben
Senior Project Director
School Infrastructure
Level 8, 8 Central Avenue
Eveleigh NSW 2015

Arboricultural Impact Assessment Report regarding 65 trees located within Parramatta East Public School, 30-32 Brabyn Street, Parramatta

Dear Matt,

We are pleased to provide the following Arboricultural Impact Assessment Report for 65 trees within the grounds of Parramatta East Public School.

Complete use of this report is authorised under the conditions limiting its use as stated in Appendix A Item 7 of “Arboricultural Reporting Assumptions and Limiting Conditions”.

Should you have any queries relating to this report, its mitigation measures, or the options considered please do not hesitate to contact us on 1300 272 671.

Regards,

Andy Clark
Consulting Arborist
Dip. Hort. (Arb.), AQF Level 5

Sita Bresnihan
Consulting Arborist
Dip. Arb., AQF Level 5

Version	Date	Author	Rationale
Draft	17 November 2022	Andy Clark	Draft
1	30 November 2022	Andy Clark	First Issue
2	16 August 2024	Sita Bresnihan	Updated plan
3	11 October 2024	Sita Bresnihan	Updated to plan/tree removals
4	17 January 2025	Sita Bresnihan	REF update
5	28 February 2025	Andy Clark	REF update
6	5 March 2025	Andy Clark	REF update

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1 Executive summary

1.1 The following is an Arboricultural Impact Assessment regarding sixty-five (65) trees located within the grounds of Parramatta East Public School. The subject site was identified by the NSW Department of Education (the Client) as possessing trees that may be impacted upon by a proposed staged activity.

1.2 In part, the project scope was to nominate subject trees that can be retained, or require removal to facilitate the proposed activity, as well as identify and reduce potential conflicts between subject trees and site activity. Accurate information on the area required for tree retention and methods/techniques suitable for tree protection during construction have been provided.

1.3 Trees 42, 43, 44, 55 and 59-65 would require arborist supervision during the demolition/removal of the existing demountable buildings. The use of excavators, cranes, or similar lifting devices must be restricted to load bearing surfaces such as roads and car parks during the removal of demountable buildings. Methodologies surrounding building removal must cause minimal disturbance to trees, such as dissembling the dwelling and/or accessing the buildings without encroaching into TPZs. Pre-activity pruning and minor crown lifting is acceptable to prevent significant damage to the trees in consultation with the project arborist as detailed in 7.11 of this Report.

1.4 Tree 33 would require installation of TPZ fencing around the unimpacted TPZ area, from the existing driveway down to the southwest property corner and back up along the edge of the proposed new staff carpark. Undertake Plant Health Care as per 7.15, 7.16 and 7.17 of this Report.

1.5 Arborist supervision would be required during removal of the existing stormwater pit within the SRZ of Tree 42 and the trenching works to install the new power connection, from the sub-station to the school buildings, within the outer TPZ of Trees 53 and 54. It was recommended that the proposed excavation commence at the outer extent of the TPZ and move inwards to minimise root damage to the trees.

1.6 Enhancement of the remaining TPZ soil area would be required for Trees 50 and 52 along with adjusted pedestrian footpath levels and arborist supervision during excavation, in the case of Tree 52.

1.7 Tree retention values have been determined based upon a modified version of the British Standard and which have been prescribed into one of the following four (4) categories, A, B, C and U. Refer to Appendix C for further detail.

1.8 Generally, relevant consent authorities will consider:

- **A** retention value trees as a site constraint and may require alterations to the proposed activity design and/or specific protection measures to allow retention, unless the proposed activity outweighs the retention value of the tree
- **B** retention value trees as a site constraint consideration, lesser changes must be considered to retain such trees
- **C** retention value trees are not considered a site constraint
- **U** retention value trees are considered a site opportunity, as such trees are recommended for removal regardless of the proposed activity.

1.9 Trees impacted by the proposed activity:

RV	Description	Total	Remove		Retain	
			located within activity footprint	irrespective of future activity	with specific protection	with generic protection
A	High retention value trees	4	5		42	9, 13
B	Moderate retention value trees	31	1, 3, 4, 6, 7		33, 43, 50, 52, 53, 59, 60, 61, 62, 63, 64, 65	8, 10, 15, 16, 19, 25, 28, 32, 35, 36, 37, 38, 41, 48
C	Low retention value trees	26	2, 46, 47, 49, 51		44, 54, 55	11, 12, 14, 17, 18, 20, 21, 22, 23, 24, 27, 29, 30, 31, 34, 40, 57, 58
U	Trees to be removed irrespective of proposed activity	4	45			26, 39, 56

Impact	Mitigation measure	Significance after mitigation
Demolition Tree 42, 43, 44, 55 and 59-65	Trees require **arborist supervision** during the demolition/removal of the existing demountable buildings. The use of excavators, cranes, or similar lifting devices must be restricted to load bearing surfaces such as roads and car parks during the removal of demountable buildings. Methodologies surrounding building removal must cause minimal disturbance to trees such as, dissembling the dwelling and/or accessing the buildings without encroaching into TPZs. Pre-activity pruning and minor crown lifting is acceptable to prevent significant damage to the trees in consultation with the project arborist as detailed in section 7.11 of this Report.	Not significant
Construction Tree 33	Tree will require installation of **TPZ fencing** around the unimpacted TPZ area, from the existing driveway down to the southwest property corner and back up along the edge of the proposed new staff carpark immediately prior to commencement of construction in the area. **Plant Health Care** works, as detailed in section 7.15, 7.16, 7.17 of this Report, are to commence at the same time.	Not significant
Construction Tree 42, 53 and 54	Trees require **arborist supervision** during removal of the existing stormwater pit within the SRZ of Tree 42 and the trenching works to install the new power connection, from the sub-station to the school buildings, within the outer TPZ of Tree 53 and 54. It was recommended that the proposed **excavation commence at the outer extent of the TPZ** and move inwards to minimise root damage to the trees.	Not significant
Construction Tree 50	The pedestrian footpath is to be **constructed above existing grade** and undertake **Plant Health Care** works.	Not significant
Construction Tree 52	Tree requires **arborist supervision** during excavation works for the new entrance footpath within the TPZ as well as undertake **Plant Health Care** as per 7.15, 7.16, 7.17 of this Report to enhance the remaining TPZ area.	Not significant
Construction Tree 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 34 35 36 37 38 39 40 41 48 56 57 58	Refer to Section 7.4 for generic protection measures.	Not significant

2 Introduction

2.1.1 This report has been prepared to nominate subject trees that can be retained, or require removal to facilitate the proposed activity, as well as identify and reduce potential conflicts between subject trees and site activity. Accurate information on the area required for tree retention and methods/techniques suitable for tree protection during construction have been provided.

2.2 Summary of the activity

2.3 This Arboricultural Impact Assessment (Report) has been prepared by Civica ArborSafe on behalf of the NSW Department of Education to assess the potential environmental impacts that could arise from the Parramatta East Public School (PEPS) upgrade (the Proposal) at 30-32 Brabyn Street, North Parramatta (the site). The works are proposed by the NSW Department of Education to meet the growth in educational demand in Collet Park precinct, and the broader North Parramatta area.

2.4 The activity comprises upgrades to PEPS to provide replacement teaching facilities in place of the existing temporary and permanent facilities that are no longer fit for purpose, involving the following works:

- Site preparation and required earthworks;
- Demolition of existing Buildings C, D, E and F, and associated structures including adjacent ramps and walkways;
- Construction of the following:
  - A new 3-storey school building (referred to as Block R) including teaching spaces, library/administration, and staff/student amenities;
  - Upgrade of soft and hard landscape and playground areas;
  - A new at-grade parking area;
  - Formalised waste area, with access being retained from Gaggin Street;
  - Public Domain Works with upgrades to the pedestrian access south of the school, and new kiss and ride zone on Albert Street East;
  - Entrance and School logo signage along the Northern Albert Street East frontage of Block R;
- Refurbishment works to existing buildings;
- Removal of trees as required and retention where possible; and
- Installation and augmentation of services and infrastructure as required.

2.4.1 Refer to the Review of Environmental Factors prepared by Ethos Urban for a full description of works.

2.4.2 The report was intended to provide information on site trees and how they may be impacted upon by the proposed activity. Report findings and mitigation measures provided are based upon guidance provided within Australian Standard AS 4970–2009: *Protection of Trees on Development Sites*.

2.4.3 Observations and mitigation measures provided within this report are based upon information provided by the Client and an arborist site visit.

2.5 Site description

2.5.1 The site is located at 30-32 Brabyn Street within the City of Parramatta Local Government Area. Parramatta East Public School is located in the suburb of North Parramatta, within the City of Parramatta Local Government Area (LGA). The site is approximately 1.5km northeast of the Parramatta CBD, and 24km west of the Sydney CBD.

2.5.2 The site currently comprises a single lot to make up Parramatta East Public School, referred to as **Lot 100, DP1312418**, and the land is owned by the Minister for Education and Early Learning.

2.5.3 The site has an area of approximately 1.782Ha, is of an irregular shape, and is bounded by Brabyn Street to the West, Albert Street East to the North, and Gaggin Street/Webb Street to the East. The project area is contained within the site and represents where the proposed works will be undertaken, with an area of approximately 1.492Ha.

2.5.4 An aerial image of the site and project area is shown in Figure 1 below.

Figure 1. Whole site image (location). Red lines delineate the boundary line of the Parramatta East Primary School. Nearmap (Ethos Urban), 2024.

2.6 Significance of environmental impacts

2.6.1 Based on the identification of potential issues, and an assessment of the nature and extent of the impacts of the proposed activity, it is determined that:

- The extent and nature of potential impacts are low and will not have significant impact on the locality, community and/or the environment.
- Potential impacts can be appropriately mitigated or managed to ensure that there is minimal impact on the locality, community and/or the environment.

3 Scope

3.1 Carry out a visual examination of the nominated trees located within the proposed activity.

3.2 Provide an objective appraisal of the subject trees in relation to their species, estimated age, health, structural condition, useful life expectancy (ULE) and viability within the landscape.

3.3 Based on the findings of this investigation, provide independent recommendations on the retention value of the trees.

3.4 Nominate subject trees that can be retained or require removal to facilitate the activity.

3.5 Identify and reduce potential conflicts between subject trees and site activity by providing accurate information on the area required for tree retention and methods/techniques suitable for tree protection during construction.

3.6 Provide information on restricted activities within the area nominated for tree protection, as well as suitable construction methods to be adopted during demolition and/or construction.

4 Methodology

4.1 Data collection

4.1.1 Ian Consalvey and Neil Martin of Civica ArborSafe carried out a site inspection of the subject trees on 20 May 2022.

4.1.2 Trees that are the subject of this report (Figure 2) were identified during discussions with the Client, reviewing relevant supplied activity documentation and reviewing the description of a non-exempt 'Tree' as identified within the City of Parramatta's relevant documentation.

4.1.3 Pursuant with information supplied on the Parramatta Council website (*Trees & Development, Arborist Report Requirements*) all site trees above 5m in height have been included (City of Parramatta, 2025). Smaller trees/shrubs within the site may have been omitted from the report based on their species, current size and/or potential future size and limited contribution to local amenity.

4.1.4 The subject trees were inspected from the ground using the initial component of Visual Tree Assessment (VTA) (Mattheck, 1994). No foliage or soil samples were taken and no aerial, underground or internal investigations were undertaken.

4.1.5 Tree height and crown width were estimated and have been provided in a variety of ranges with 5m increments. Trunk diameter at breast height (DBH) and trunk diameter at the root crown (DRB) were measured with a diameter tape and provided to the nearest centimetre.

4.1.6 TPZ encroachment calculations are based upon measurements obtained from using PDF measuring tools and/or scale ruler and/or measurement descriptions from the assessing arborists against plans showing surveyed tree locations (which have individual CAD drawn TPZs displayed) calculated within a dedicated TPZ calculator.

4.1.7 Environmental and heritage information has been sourced from the NSW Central resource for Sharing and Enabling Environmental Data (SEED) mapping tool. The source of all information has been referenced accordingly.

4.1.8 Data collected on site was analysed against the supplied activity documentation by Andy Clark, following which relevant findings and mitigation measures were formulated and collated into report format.

4.1.9 Tree protection zones (TPZ) and structural root zones (SRZ) were calculated in accordance with the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites* (refer to Section 7.6).

4.1.10 Retention values have been determined based upon a modified version of the British Standard BS 5837–2012: *Trees in Relation to Design, Demolition and Construction* (refer to Appendix C).

4.1.11 All photographs were taken at the time of the site inspections by the author and have not been altered for brightness or contrast, nor have they been cropped.

4.1.12 Updated plans of the proposed activity were provided to Civica ArborSafe in February 2025.

4.1.13 Proposed underground service locations have been reviewed in the preparation of this report.

5 Observations

5.1 Location

5.1.1 The proposed activity area was largely located within the northern half of the level (grade) Parramatta East Public School grounds (Figure 1), where most of the existing school building infrastructure is located, the southern half consisting of managed/grassed open space with a scattering of trees.

5.1.2 The school's existing teaching and administration spaces consist of a number of small and older permanent buildings and a large proportion of demountable buildings.

5.1.3 The school is bordered to the west, north and east by residential roads with property surrounding the school being exclusively residential.

5.1.4 The site is located within the City of Parramatta Local Government Area (LGA).

5.1.5 The soil landscape for the site is likely to be disturbed which is typical of an urban site. Soil type is therefore expected to deviate from its natural state due to extensive previous site development and its location within an urban area. SEED (NSW Government, 2022) identifies the remnant site soils to be that of Kurosols whereby: Kurosols are soils that have a strong texture contrast between the surface (A) horizons and the clay subsoil (B) horizons. The subsoil is strongly acidic (pH of 5.4 or less in water) and non-sodic (at least in the upper horizons) (Isbell, 2002).

5.1.6 Consistent with SEED modelling and the Parramatta Development Control Plan (DCP) 2023, Development is to ensure that sites with potential to contain acid sulfate soils are managed in a manner consistent with the provisions contained in the Parramatta Local Environment Plan (LEP) 2011 (City of Parramatta, 2023).

5.2 Site Trees

5.2.1 A total of 65 trees were inspected and are the subject of this report. All trees were situated within the grounds of the Parramatta East Public School. There is an additional street tree (*Callistemon viminalis*) on Albert Street, that is not included in this report as the activity will be outside of the trees TPZ. Complete attributes for each tree can be found in Appendix E – Tree Assessment Data.

5.2.2 Trees can be identified on site using tree tags which are typically located at approximately 2m from ground level on the southern side of the trunk.

5.2.3 All site trees were considered planted stock, with no remnant trees identified.

5.2.4 The treescape was relatively young with 54% (35) of the existing surveyed trees rated as semi-mature specimens, with a further 15% (10) being in the Young to Juvenile category. 31% (20) were in the mature aged category.

5.2.5 Twenty-eight species were identified across the site with the most prevalent being *Lophostemon confertus* (Brush Box), *Casuarina glauca* (Swamp She Oak) and *Ulmus parvifolia* (Chinese Elm).

Figure 2. Site map showing subject trees. Tree attributes are to be obtained from Appendix E – Tree Assessment Data. ArborSite, May 2022.

5.3 Proposed Construction

5.3.1 The activity includes four key stages to allow operations in a live school environment to continue without disruption. This includes an early works stage to prepare for the demolition of existing buildings, the demolition of 4 existing buildings and the construction of a new 3-storey building (including associated landscaping), the refurbishment of 4 existing buildings and finally the removal of 21 existing demountable teaching spaces and associated landscaping.

5.3.2 In more detail the activity comprises:

- Site preparation and required earthworks;
- Demolition of existing Buildings C, D, E and F, and associated structures including adjacent ramps and walkways;
- Construction of the following:
  - A new 3-storey school building (referred to as Block R) including teaching spaces, library/administration, and staff/student amenities;
  - Upgrade of soft and hard landscape and playground areas;
  - A new at-grade parking area;
  - Formalised waste area, with access being retained from Gaggin Street;
  - Public Domain Works with upgrades to the pedestrian access south of the school, and new kiss and ride zone on Albert Street East;
  - Entrance and School logo signage along the Northern Albert Street East frontage of Block R;
- Refurbishment works to existing buildings;
- Removal of trees as required and retention where possible; and
- Installation and augmentation of services and infrastructure as required.

5.3.3 Associated landscaping and civil infrastructure will be upgraded to accommodate the new building layout, such as a new entrance path from Albert Street East, new storm water pipes and a new power connection from a sub-station on the Albert Street East frontage.

Figure 3. Excerpt from existing Site Demolition Plan. (PEPS-JDH-003, Revision C). JDH Architecture, 2 October 2024.

Figure 4. Excerpt from Site Plan Proposed. (PEPS-JDH-ZZ-XX-DR-A-0012, Revision B). JDH Architecture, 11 December 2024.

5.4 Tree Retention Values

5.4.1 Retention values were determined based upon a modified version of the British Standard BS 5837–2012: *Trees in Relation to Design, Demolition and Construction*. This standard categorises tree retention value based upon assessment of the tree's quality (health and structure), and life expectancy. Other criteria such as its physical dimensions, age class, location and its Amenity, Heritage and Environmental significance are also considered. A breakdown of attributes required for each category can be obtained from Appendix C – Tree Retention Values.

Category	Tree numbers
A	5, 9, 13, 42
B	1, 3, 4, 6, 7, 8, 10, 15, 16, 19, 25, 28, 32, 33, 35, 36, 37, 38, 41, 43, 48, 50, 52, 53, 59, 60, 61, 62, 63, 64, 65
C	2, 11, 12, 14, 17, 18, 20, 21, 22, 23, 24, 27, 29, 30, 31, 34, 40, 44, 46, 47, 49, 51, 54, 55, 57, 58
U	26, 39, 45, 56

5.5 Heritage Status

5.5.1 The proposed activity site was not determined to be within a commonwealth or state heritage listed area and no trees were identified as being of national, state, or local heritage significance (NSW Government, 2021).

5.6 Botanical and Environmental Significance

5.6.1 Most site trees were considered common in terms of species, age class, and cultural heritage within the local area and as such hold limited botanical significance.

5.6.2 Species generally considered as weed species, namely the camphor laurel, have generally been given lower consideration in regard to tree retention, than their ULE, size, health and structure may ordinarily have warranted.

6 Discussion

6.1 Determining TPZ encroachment

6.1.1 **Major encroachment**. As per the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites*, a major encroachment into the TPZ of any tree is considered to occur when it is beyond 10% of the total TPZ area. Trees with major encroachment may require removal or, in certain instances, be retained with specific protection requirements throughout the construction stage.

6.1.2 **Minor encroachment**. Under the aforementioned standard, a minor encroachment is determined as being less than 10% of the total TPZ area. Trees with minor encroachment may be retained with specific, generic or no protection requirements throughout the construction stage.

6.1.3 **No encroachment**. Trees with no encroachment may be retained with generic or no protection requirements throughout the construction stage.

6.1.4 For the purposes of this report, trees to be removed or retained have been identified as those:

- Requiring removal due to a level of encroachment into their TPZ that would likely result in a detrimental impact upon their future health and/or stability
- Retainable and requiring specific protection requirements throughout construction (i.e. generic requirements plus arborist supervision and careful construction methods within their TPZ)
- Retainable and requiring generic tree protection measures only (i.e. protective fencing and restriction of activities within the TPZ).

6.2 Impact of proposed activity

6.2.1 A review of the proposed design has been undertaken in the context of tree retention and removal across the site.

6.2.2 The main activity impact which affects trees is through significant root damage due to major TPZ encroachment. Root damage largely occurs due to two (2) main impacts – soil compaction (compacting existing site soil to build on or installing additional fill to raise soil levels) and/or direct root severance (excavation for service installation or lowering surface levels).

6.2.3 Negative tree impacts can manifest as either a reduction in health and/or vigour due to root loss (absorption and/or transport roots) resulting in a reduction in water and nutrient absorption capability or on tree stability if larger roots are severed or impacted. Ultimately, the outcome for the trees depends on a number of variable factors including species, age, current health, TPZ encroachment percentage, soil type, topography, previous site use and the proposed design and construction methodology.

6.2.4 Compacted soils, especially artificially compacted soils such as those found under driveways, carparks or building foundations, have a higher bulk density down to a deeper level of subsoil. Bulk density is the term used for describing the weight of soil per unit volume. The broad engineering thinking is that the higher the density the more stable the road surface due to less soil movement in expansion, contraction, or compression. A higher bulk density is produced by compacting the soil to reduce available pore space between the soil particles.

6.2.5 The effect of compacted soils on plants is somewhat influenced by the soil type but generally a reduction in available pore space reduces the available area for oxygen and water within the soil. A reduction in available soil water and oxygen inhibits root activity within the soil, as they are essential for root elongation and growth, and the lack of these properties is considered a major limiting factor. The impact of significant soil level rises across the TPZ generally occurs over a longer time frame, as the stored energy can still be utilised and shifted within the tree even if the long-term use of the affected root is limited, than if the roots were directly severed. This generally allows the tree more time to react to the changed growing environment. Root severance has the same effect, reduction in root function and capability, but on an instantaneous time scale where there is no time for the tree to adjust.

6.2.6 The assumption of allowable encroachment and minimal long-term health or structural impacts to the trees rely on a combination of the following being used - root sensitive construction methods being adhered to within the TPZ, minimal excavation within the TPZ to limit root severance (i.e. construction placed outside the TPZ where possible), fill rather than excavation utilised to affect level changes where possible (i.e. to minimise root severance and allow the trees root system time to adjust), no construction occurring within the SRZ, compensatory area being available around the unimpacted aspects of the trees and the enhancement of the existing TPZ area (i.e. mulched, soil conditioning and irrigation when required).

6.2.7 Twelve trees were affected by direct conflict and/or major TPZ encroachment with proposed construction footprints and would require removal under the current design.

- Tree 1-7 are semi-mature trees of mixed RV in direct conflict with the proposed bin storage and pickup hardstand.
- Tree 45, 46 and 47 are semi-mature trees of Zero to Low RV in direct conflict with the location of the new library building.
- Tree 49 and 51 are trees of Low RV which have major TPZ encroachment of >25% due to conflict with the location of the new Library building.

6.2.8 Sixteen of the remaining trees require specific protection measures, largely during demolition and/or installation/removal of demountable buildings and/or installation of underground infrastructure.

6.2.9 Tree 33, a mature *Eucalyptus microcorys* (Tallowwood), is assessed as having additional TPZ incursion due to the proposed new carpark entrance in its northeastern aspect and expanded Council pedestrian footpath. Based on an adjusted TPZ shape, to take into account the existing driveway which is likely to act as a deterrent to development of significant root mass due to a lack of water and nutrients under impermeable surfaces, the encroachment was calculated at 15%. It is considered by protecting and enhancing the remaining TPZ area, minimal long term negative impacts would entail.

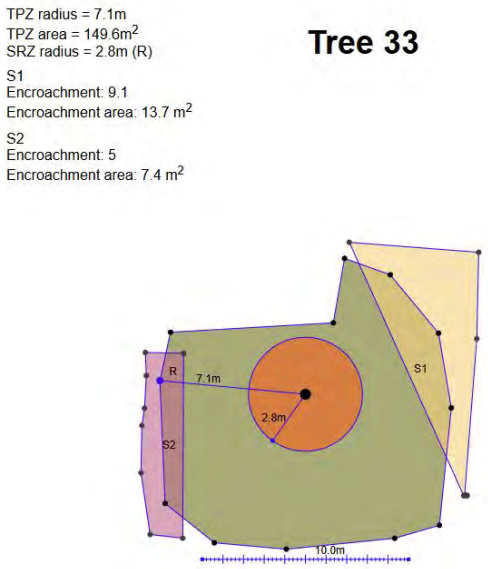


Figure 5. Image of TPZ calculation for Tree 33. Civica ArborSafe, October 2024.

6.2.10 Eleven Trees (numbered 42, 43, 44, 55, 59, 60, 61, 62, 63, 64 and 65) require added protection and care during initial demolition and/or the removal/installation of demountable buildings due to their close proximity to the activity. Trunk protection and/or root plate protection may be required as directed by the project arborist during these operations.

6.2.11 Tree 50, *Syzygium leuhmannii* (Small-leaved Lilly Pilly), has a major TPZ encroachment, calculated at 20%, due to conflict with the new library building footprint and associated perimeter footpath. Construction of the footpath above grade and enhancement of the remaining TPZ area with either mulch, irrigation and/or nutrient additives would minimise impacts.

6.2.12 Tree 52, *Syzygium leuhmannii* (Small-leaved Lilly Pilly), has a major TPZ encroachment, calculated at 15%, due to conflict with the proposed realigned entrance footpath. Enhancement of the remaining TPZ area with either mulch, irrigation and/or nutrient additives would minimise impacts.

6.2.13 An underground power cable will connect into the school buildings from the upgraded sub-station, situated between Trees 53 and 54 on the Albert St East road frontage. The probable trench alignment will constitute a minor TPZ encroachment and have minimal long-term effect if undertaken in an appropriate manner and with Arborist supervision.

7 Tree protection and mitigation measures

7.1 Tree removal

7.1.1 Twelve trees would require removal as follows, based on the supplied design activity.

Mitigation measure	Category A High retention value		Category B Moderate retention value		Category C Low Retention value		Category U No retention value	
	Qty	Tree numbers	Qty	Tree numbers	Qty	Tree numbers	Qty	Tree numbers
Remove for activity	1	5	5	1, 3, 4, 6, 7	5	2, 46, 47, 49, 51	1	45

Figure 6. Site map showing trees requiring removal. ArborSite, October 2024.

7.2 Tree retention

7.2.1 Fifty-three trees were recommended for retention and require generic, and in some cases specific, protection measures during construction to ensure they remain viable following the completion of the activity.

7.2.2 New underground infrastructure must be aligned outside the TPZs of trees designated for retention to minimise potential root damage and soil disturbance.

Mitigation measure	Category A High retention value		Category B Moderate retention value		Category C Low Retention value	
	Qty	Tree numbers	Qty	Tree numbers	Qty	Tree numbers
Retain with specific protection requirements	1	42	12	33, 43, 50, 52, 53, 59, 60, 61, 62, 63, 64, 65	3	44, 54, 55
Retain with generic protection requirements	2	9, 13	14	8, 10, 15, 16, 19, 25, 28, 32, 35, 36, 37, 38, 41, 48	18	11, 12, 14, 17, 18, 20, 21, 22, 23, 24, 27, 29, 30, 31, 34, 40, 57, 58

Figure 7. Site map showing all trees to be retained requiring generic/specific protection measures. ArborSite, October 2024.

7.3 Specific protection measures

Mitigation measure (Refer Section 7.5–7.9)	Category A High retention value		Category B Moderate retention value		Category C Low Retention value	
	Qty	Tree numbers	Qty	Tree numbers	Qty	Tree numbers
Retain with specific protection requirements	1	42	12	33, 43, 50, 52, 53, 59, 60, 61, 62, 63, 64, 65	3	44, 54, 55

Figure 8. Site map showing trees requiring specific protection measures. ArborSite, October 2024.

7.3.1 Trees 42, 43, 44, 55 and 59-65 would require arborist supervision during the demolition/removal of the existing demountable buildings. The use of excavators, cranes, or similar lifting devices must be restricted to load bearing surfaces such as roads and car parks during the removal of demountable buildings. Methodologies surrounding building removal must cause minimal disturbance to trees such as, dissembling the dwelling and/or accessing the buildings without encroaching into TPZs. Pre-activity pruning and minor crown lifting is acceptable to prevent significant damage to the trees in consultation with the project arborist as detailed in section 7.11 of this Report.

7.3.2 Tree 33 would require installation of TPZ fencing around the unimpacted TPZ area, from the existing driveway down to the southwest property corner and back up along the edge of the proposed new staff carpark. Undertake Plant Health Care as per section 7.15, 7.16, 7.17 of this Report.

7.3.3 Tree 42, 53 and 54 would require arborist supervision during removal of the existing stormwater pit within the SRZ of Tree 42 and the trenching works to install the new power connection, from the sub-station to the school buildings, within the outer TPZ of Tree 53 and 54. It was recommended that the proposed excavation commence at the outer extent of the TPZ and move inwards to minimise root damage to the trees.

7.3.4 Tree 50 – the pedestrian footpath is to be constructed above existing grade and undertake Plant Health Care as per 7.15, 7.16, 7.17 of this Report to enhance the remaining TPZ area.

7.3.5 Tree 52 would require arborist supervision during excavation works for the new entrance footpath within the TPZ as well as undertake Plant Health Care as per 7.15, 7.16, 7.17 of this Report to enhance the remaining TPZ area.

7.3.6 Excavation works within TPZ areas are to be undertaken using techniques that are sensitive to tree roots to avoid unnecessary damage. Such techniques include:

- Excavation using a high-pressure water jet and vacuum truck
- Excavation using a small excavator with an additional spotter
- Excavation by hand.

7.3.7 Roots discovered are to be treated with care and minor roots (<40mm diameter) pruned with a sharp, sterile handsaw or secateurs. All significant roots (>40mm diameter) are to be recorded, photographed and reported to the project arborist.

7.4 Generic protection and reporting measures

7.4.1 All trees to be retained require generic protection during the construction stage. Tree protection measures include a range of:

- Activities restricted within the TPZ
- Protective fencing
- Trunk and ground protection
- Tree protection signage
- Involvement from the project arborist
- Project milestones
- Compliance reporting

7.5 Activities prohibited within the TPZ

- Machine excavation including trenching
- Storage
- Preparation of chemicals, including cement products
- Parking of vehicles and plant
- Refuelling
- Dumping of waste
- Wash down and cleaning of equipment
- Placement of fill
- Lighting of fires
- Soil level changes
- Temporary or permanent installation of utilities and signs
- Physical damage to the tree

7.6 Protective fencing specification

7.6.1 Protective fencing (Figure 9) is to be installed as far as practicable from the trunk of any retained trees. Fencing must be erected as per the image below before any machinery or materials are brought to site and before commencement of the activity (including demolition).

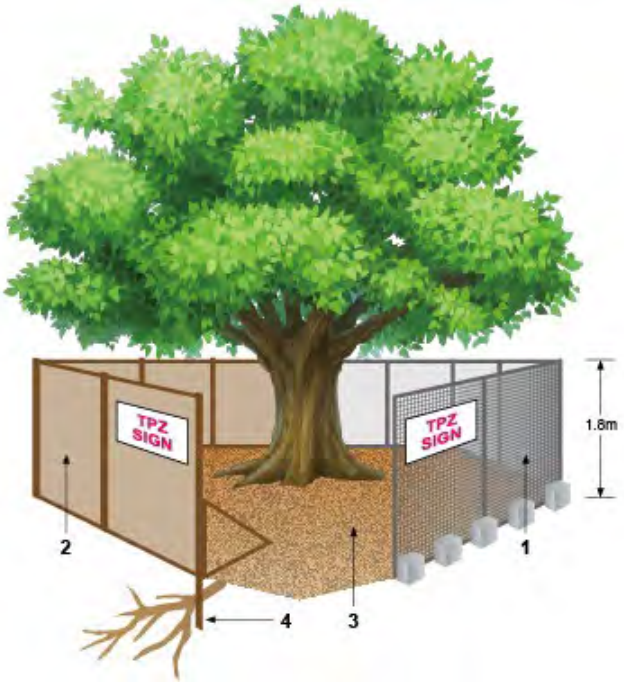
7.6.2 In some areas of the site (i.e. protection of trees on neighbouring properties) existing boundary fencing may be used as an alternative to protective fencing.

7.6.3 Once erected, protective fencing must not be removed or altered without approval from the project arborist. The TPZ fencing must be secured to restrict access.

7.6.4 TPZ fencing is to be a minimum of 1.8m high and mesh or wire between posts must be highly visible. Fence posts and supports must have a diameter greater than 20mm and must ideally be freestanding, otherwise be located clear of the roots. See image below.

7.6.5 Tree protection fencing must remain intact throughout the proposed activity and must only be dismantled after their conclusion. The temporary dismantling of tree protection fencing must only be done with the authorisation of a consulting arborist and/or the responsible authority.

7.6.6 The subject trees themselves must also not to be used as a billboard to support advertising material. Affixing nails or screws into the trunks of trees to display signs of any type is not a recommended practice in the successful retention of trees.



Legend:
1. Chain wire mesh panels with shade cloth attached (if required), 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 discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage materials of any kind are permitted within the TPZ
4. Bracing is permissible within the TPZ. Installation of supports must avoid damaging roots.

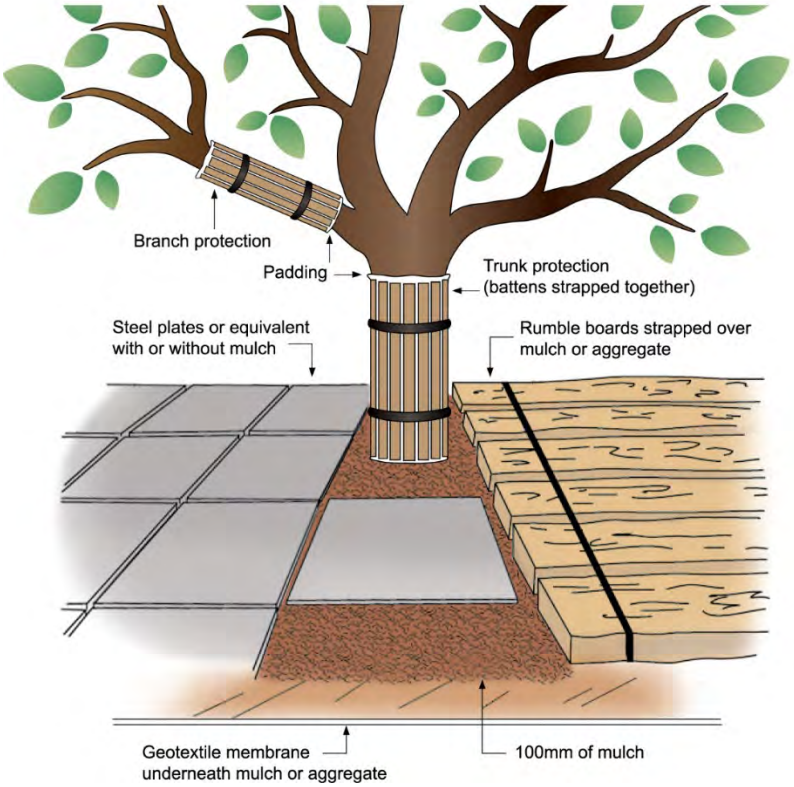
Figure 9. Depicts standard fencing techniques. AS 4970–2009.

7.7 Trunk and ground protection

7.7.1 Given that proposed works are often within the TPZs of retained trees, standard protective fencing may not always be a viable method of protection. In these areas trunk protection and ground protection must be installed prior to the commencement of the activity and remain in place until after construction activity has been completed.

7.7.2 Where construction access into the TPZ of retained trees cannot be avoided, the root zone of each tree must be protected using either steel plates or rumble board strapped over mulch/aggregate until such a time as permanent above ground surfacing (cellular confinement system or similar) is to be installed.

7.7.3 Trunk and ground protection (Figure 8) must be undertaken in line with the Australian Standard AS 4790–2009: *Protection of Trees on Development Sites* as per the image below:



Notes:
1. For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.
2. Rumble boards must be of a suitable thickness to prevent soil compaction and root damage.

Figure 10. Depicts trunk and ground protection techniques. AS 4970–2009.

7.8 Tree protection signs

7.8.1 Signs identifying the TPZ (Figure 11) must be placed at 10m intervals around the edge of the TPZ and must be visible from within the activity site.

Figure 11. Depicts an example of a tree protection sign. AS 4970–2009.

7.9 Project arborist

7.9.1 An official “project arborist” must be commissioned to oversee the tree protection, any activity within the TPZ’s and complete regular monitoring compliance certification.

7.9.2 The project arborist must have minimum five years industry experience in the field of arboriculture, horticulture with relevant demonstrated experience in tree management on construction sites, and Diploma level qualifications in arboriculture – AQF Level 5.

7.9.3 Inspections are to be conducted by the project arborist at several key points during the construction in order to ensure that protection measures are being adhered to during construction stages and decline in tree health or additional remediation measures can be identified.

7.10 Project milestones

7.10.1 The following visits and milestones were recommended as to when on-site tree inspection by the project arborist is required:

Item	Purpose of Visit	Timing of Visit(s)	Prerequisites
1	Pre-start induction	Following sign off from Item 1. Contractor to provide a minimum of five days advance notice for this visit.	Prior to commencement of works. All parties involved in the project to attend.
2	Supervision of works in TPZ’s including all regrading and excavations	Whenever there is work planned to be performed within the TPZ’s. Contractor to provide a minimum of five days advance notice for such visits.	
3	Regular site inspections	Minimum frequency monthly for the duration of the project.	The checklist must be completed by the project arborist at each site inspection and signed by both parties.
4	Final sign off	Following completion of works.	Practical completion of works and prior to tree protection removal.

7.11 Pruning

7.11.1 It is anticipated that minor pruning only will be required, largely centred on reduction or crown lifting to facilitate site access during construction, of no greater than 10% of any one tree's total crown area. Such pruning is considered to have minimal long term health impacts to the tree.

7.11.2 Tree 38, a *Cinnamomum camphora* (Camphor Laurel), would require targeted reduction pruning of a slightly larger percentage (i.e. 10-20%) within the outer eastern portion of its crown to facilitate construction. Based on the tree species, age and health this pruning was also considered likely to have minimal long term health impacts on the tree.

7.11.3 Reduction pruning must focus on the removal of smaller diameter branches where feasible and remove no greater than 10% of the total crown (unless approved by the project arborist). Branches no greater than 50mm diameter are to be removed unless specifically approved by the project arborist.

7.11.4 All pruning is recommended to be completed in accordance with the Australian Standard AS 4373–2007: *Pruning of Amenity Trees* (Standards Australia, 2007) and undertaken by a suitably qualified arborist (minimum AQF 3 arborist).

7.12 Compliance reporting

7.12.1 Following each inspection, the project arborist shall prepare a report detailing the condition of the trees. These reports must certify whether or not the activity have been completed in compliance with the consent relating to tree protection.

7.12.2 These reports must contain photographic evidence where required to demonstrate that the work has been carried out as specified.

7.12.3 Matters to be monitored and included in these reports must include tree condition, tree protection measures and impact of site activity which may arise from changes to the approved plans.

7.12.4 The reports and Compliance Statements shall be submitted to the Project Manager (as well as the Clients' nominated representative) following each inspection.

7.12.5 The reports and any Non-Compliance Statements shall be submitted to the Project Manager (as well as the Clients' nominated representative) if tree protection conditions have been breached. Reports must contain clear remedial action specifications to minimise any adverse impact on any subject tree.

7.13 Additional Excavation/Trenching within TPZs

7.13.1 In the event additional excavation is required within the TPZs of retained trees identified within this report, or any other site trees, arborist involvement will be required to ensure the activity is undertaken in accordance with the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites.*

7.13.2 Where excavation or trenching is required to facilitate installation of underground services within the TPZs of any site trees arborist supervision is required. Works must be undertaken using techniques that are sensitive to tree roots to avoid unnecessary damage. Such techniques include:

1. Excavation by hand
2. Excavation using a small <1 tonne tracked excavator with an additional spotter,
3. Excavation using a high-pressure water jet and vacuum truck
4. Excavation using an Air Spade with vacuum truck.

7.13.3 Machine excavation must be prohibited within the TPZs of retained trees unless undertaken at the direct consent from the project arborist and/or the responsible authority.

7.14 Offset tree planting

7.14.1 Offset planting must reflect the number of trees removed and the initial loss of amenity and biomass. New trees must be of long-term potential and sourced from a reputable supplier.

7.14.2 Replacement tree species must suit their location on the site in terms of their potential physical size and their tolerance(s) to the surrounding environmental conditions. To avoid unethical or unprofessional tree selection and/or their placement within the landscape, replacement tree species must be selected in consultation with a consulting arborist, who can also assist in implementing successful tree establishment techniques.

7.14.3 Replacement tree species must have the genetic potential to reach a mature size potential of those trees removed to facilitate the activity. As a guide, potential height will be a minimum of 10m (or more) and produce a spreading canopy so as they may provide amenity value to the property and contribute to the tree canopy of the surrounding area in the future.

7.15 Plant Health Care

7.15.1 When managing a tree affected by activity incursions within its TPZ, plant tonic and growth stimulant drenching must be undertaken. Plant tonic and growth stimulant drenching is the process of adding diluted products directly to the root area of a tree to promote and assist trees to cope with loss of roots during the activity process. They also assist trees to provide better resistance to sap sucking insects and fungal attack/disease and improve the establishment of beneficial microbial populations and nutrient uptake. See Appendix D – Plant Health Care and Mulching

7.16 Irrigation

7.16.1 Regular checks are required to ensure retained trees are receiving the correct amount of water. The majority of a tree's fine water absorbing roots are located in the top 10–30cm of soil. To undertake a basic soil moisture test, dig a small hole to a depth of 40cm at the dripline of the tree. If the soil is moist at this depth, water is not needed. Slow irrigation that provides an even coverage and targets the absorbing roots is the key to successful irrigation and encourages a deeper tree root system. Irrigation near the trunk is unnecessary as for most trees there are generally fewer water absorbing roots in this area. Irrigating the soil from half-way between the trunk and the dripline as well as beyond the dripline will provide water where it will most effectively be used. Preferably, water your trees during the cooler evening and early morning period when temperatures are lower, humidity is higher, and the air is calmer thereby reducing water evaporation from the soil surface. Irrigation in the middle of the day is not harmful to most trees however it is less efficient.

7.17 Mulching

7.17.1 Mulching regulates soil moisture and temperature levels, suppresses weeds, minimises soil compaction and reduces run off during periods of heavy rain. Acquiring wood chip mulch from programmed tree works (and by purchasing it from local tree contractors) would be a proactive way to improve the growing conditions around trees that ultimately will result in improved tree health and vitality.

7.17.2 Mulch must aim to cover an area at least as large as a tree’s crown projection (and preferably larger) for it to be effective. It must also be laid at a uniform thickness of 75–100mm. Mulch must also be placed over damp to wet soil and never over dry soil. Application during the cooler months of the year is ideal. In areas where grass exists where you wish to mulch, spray the grass first with a non-selective herbicide and allow it to wilt and die before placement. This practice will negate grass growing up through the mulch over time.

7.17.3 Mulching within the canopy areas of trees not only improves long term tree health but also acts to reduce tree risk by reducing targets that pass and/or congregate under their canopies. This in turn will minimise the likelihood of injury in the event of a branch failure.

8 References

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Plans of the existing site and of the proposed activity were provided to ArborSafe in mid-November 2022, July, August and October 2024 and include:

- Demolition Site Plan Phase 01, Job No. 1291, Sheet No. 2.11, Revision I-WIP. JDH Architects, Work in Progress
- Proposed Site Plan_Phase 01, Job No. 1291, Sheet No. 2.12, Revision I-WIP. JDH Architects, Work in Progress
- Proposed Site Plan_Phase 02, Job No. 1291, Sheet No. 2.13, Revision I-WIP. JDH Architects, Work in Progress
- Site Plan Proposed, PEPS-JDH-ZZ-XX-DR-A-0012, Revsion J-WIP. JDH Architects, July 2024
- Demolition Plan, PEPS-JDH-ZZ-XX-DR-A-001, Revsion I-WIP. JDH Architects, July 2024
- Design Landscape Concept Plan, Dwg. No. SK-01, Ver. B. Space Landscape, 7 August 2024
- Site Plan Demolition, Dwg. No. PEPS-JDH-003, Rev. C. JDH Architects, 2 October 2024
- Site Plan Proposed, Dwg. No. PEPS-JDH-004, Rev. C. JDH Architects, 2 October 2024
- Site Plan Proposed, Dwg. No. PEPS-JDH-ZZ-XX-DR-A-0012, Revision B. JDH Architecture, 11 December 2024

Appendix A. Arboricultural reporting assumptions and limiting conditions

1. Any legal description provided to the consultant is assumed to be correct. Any titles and ownership of any property are assumed to be good. No responsibility is assumed for matters legal in character.

2. It is assumed that any property/project is not in violation of any applicable codes, ordinances, statutes or other government regulations.

3. Care has been taken to obtain all information from reliable sources. All data has been verified in so far as possible, however, the consultant can neither guarantee nor be responsible for the accuracy of the information provided by others.

4. The consultant shall not be required to give testimony or to attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services.

5. Loss or alteration of any part of this report invalidates the entire report.

6. Possession of this report or a copy thereof does not imply right of publication or use for any purpose by anyone but the person to whom it is addressed, without the prior written consent of the consultant.

7. Neither all nor any part of the contents of this report, nor any copy thereof, shall be used for any purpose by anyone but the person to whom it is addressed, without the written consent of the consultant. Nor shall it be conveyed by anyone, including the Client, to the public through advertising, public relations, news, sales or other media, without the written consent of the consultant.

8. This report and any values expressed herein represent the opinion of the consultant and the consultant's fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.

9. Sketches, diagrams, graphs and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys unless expressed otherwise.

10. Information contained in this report covers only those items that were examined and reflect the condition of those items at the time of inspection.

11. Inspection is limited to visual examination of accessible components without dissection, excavation or probing. There is no warranty or guarantee expressed or implied that the problems or deficiencies of the plants or property in question may not arise in the future.

Appendix B. Explanation of tree assessment terms

Tree number: Refers to the individual identification number assigned within the ArborSafe software to each assessed tree on the site and the number which appears on the tree's tag.

Tree location: Refers to the easting and northing coordinates assigned to the location of the tree as obtained from the geo-referenced aerial image within the ArborSafe software.

Tree species: Provides the botanic name (genus, species, sub-species, variety and cultivar where applicable) in accordance with the International Code of Botanical Nomenclature (ICBN), and the accepted common name.

Trees in group: The number of trees encompassing a collective assessment of more than one tree. Typically grouped trees have similar attributes that can be encompassed within one data record.

Height: The estimated range in metres attributed to the tree from its base to the highest point of the canopy. Where required height will be estimated to the nearest metre.

Diameter at Breast Height (DBH): Refers to the tree's estimated trunk diameter measured 1.4m from ground level for a single trunked tree. These estimates increase in 50mm increments. Where required DBH will be measured to give an accurate measurement for single trunked trees, trees with multiple trunks, significant root buttressing, bifurcating close to ground level or trunk defects and will be measured as per the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites*.

Tree Protection Zone (TPZ): A specified area above and below ground and at a given distance measured radially away from the centre of the tree's trunk and which is set aside for the protection of its roots and crown. It is the area required to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development. The radius of the TPZ is calculated by multiplying its DBH by 12. TPZ radius = DBH × 12. (Note "Breast Height" is nominally measured as 1.4m from ground level). TPZ is a theoretical calculation and can be influenced by existing physical constraints such as buildings, drainage channels, retaining walls, etc. (Standards Australia, 2009).

Structural Root Zone (SRZ): The area close to the base of a tree required for the tree's anchorage and stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is nominally circular with the trunk at its centre and is expressed by its radius in metres. SRZ radius = (D × 50)0.42 × 0.64 (Standards Australia, 2009).

Canopy spread: The estimated range in metres attributed to the spread of the tree's canopy on its widest axis. Where required crown spread will be estimated to the nearest metre.

Origin: Refers to the origin of the species and its type.

Category	Description
Indigenous	Occurs naturally in the local area and is native to a given region or ecosystem.
State Native	Occurs naturally within State but is not indigenous.
Australian Native	Occurs naturally within Australia and its territories but is not a State native or indigenous.
Exotic Evergreen	Occurs naturally outside of Australia and its territories and typically retains its leaves throughout the year.
Exotic Deciduous	Occurs naturally outside of Australia and its territories and typically loses its leaves at least once a year.

Health: Refers to the health and vigour of the tree.

Category	Description
Excellent	Canopy full with even foliage density throughout, leaves are entire and are of an excellent size and colour for the species with no visible pathogen damage. Excellent growth indicators, e.g. seasonal extension growth. Exceptional specimen.
Good	Canopy full with minor variations in foliage density throughout, leaves are entire and are of good size and colour for the species with minimal or no visible pathogen damage. Good growth indicators, none or minimal deadwood.
Fair	Canopy with moderate variations in foliage density throughout, leaves not entire with reduced size and/or atypical in colour, moderate pathogen damage. Reduced growth indicators, visible amounts of deadwood, may contain epicormic growth.
Poor	Canopy density significantly reduced throughout, leaves are not entire, are significantly reduced in size and/or are discoloured, significant pathogen damage. Significant amounts of deadwood and/or epicormic growth, noticeable dieback of branch tips, possibly extensive.
Dead	No live plant material observed throughout the canopy, bark may be visibly delaminating from the trunk and/or branches.

Age: Refers to the life cycle of the tree.

Category	Description
Young	Newly planted small tree not fully established may be capable of being transplanted or easily replaced.
Juvenile	Tree is small in terms of its potential physical size and has not reached its full reproductive ability.
Semi-mature	Tree in active growth phase of life cycle and has not yet attained an expected maximum physical size for its species and/or its location.
Mature	Tree has reached an expected maximum physical size for the species and/or location and is showing a reduction in the rate of seasonal extension growth.
Senescent	Tree is approaching the end of its life cycle and is exhibiting a reduction in vigour often evidenced by natural deterioration in health and structure.

Structure: Refers to the structure of the tree from roots to crown.

Category	Description
Good	Sound branch attachments with no visible structural defects, e.g. included bark or acute angled unions. No visible wounds to the trunk and/or root plate. No fungal pathogens present.
Fair	Minor structural defects present, e.g. apical leaders sharing common union(s). Minor damage to structural roots. Small wounds present where decay could begin. No fungal pathogens present.
Poor	Moderate structural defects present, including bifurcations with included bark with union failure likely within 0–5 years. Wounding evident with cavities and/or decay present. Damage to structural roots.
Hazardous	Significant structural defects with failure imminent (3–6 months). Defects may include active splits and/or partial branch or root plate failures. Tree requires immediate arboricultural works to alleviate the associated risk.

Useful Life Expectancy (ULE): Useful life expectancy refers to an expected period of time the tree can be retained within the landscape before its amenity value declines to a point where it may detract from the appearance of the landscape and/or presents a greater risk and/or more hazards to people and/or property. ULE values consider tree species, current age, health, structure and location. ULE values are based on the tree at the time of assessment and do not consider future changes within the tree's location and environment which may influence the ULE value.

Category
0 Years
<5 Years
5–10 Years
10–15 Years
15–25 Years
25–50 Years
>50 Years

Defects: Visual observations made of the presenting defects of the tree and its growing environment that are, or have the capacity to impact upon, the health, structural condition and/or the useful life expectancy of the tree. Defects may include adverse physical traits or conditions, signs of structural weaknesses, plant disease and/or pest damage, tree impacts to assets or soil related issues.

Tree significance: Includes environmental, social or historical reasons why the tree is significant to the site. The tree may also be rare under cultivation or have a rare or localised natural distribution.

Arborist actions: A list of arboricultural and/or plant health care works that are aimed at maintaining or improving the tree's health, structural condition or form. Actions may also directly or indirectly reduce the risk potential of the tree such as via the removal of a particular branch or the moving of infrastructure from under its canopy.

Appendix C. Tree retention values

Based upon a modified version of the British Standard BS 5837–2012: *Trees in relation to design, demolition and construction* – recommendations.

Category and definition	Criteria (including sub-categories where appropriate)		
	1. Arboricultural qualities	**2. Landscape qualities**	**3. Cultural and environmental values**
Category A			
Trees of High Quality with an estimated remaining life expectancy of at least 25 years and of dimensions and prominence that it cannot be readily replaced in <20 years.	Trees that are particularly good examples of their species, especially if rare or unusual (in the wild or under cultivation); or those that are important components of groups or avenues.	Trees or groups of significant visual importance as arboricultural and/or landscape features. (e.g. feature and landmark trees).	Trees, groups or plant communities of significant conservation, historical, commemorative or other value (e.g. remnant trees, aboriginal scar trees, critically endangered plant communities, trees listed specifically within a Heritage statement of significance).
Category B			
Trees of Moderate Quality with an estimated remaining life expectancy of 15–25 years and of dimensions and prominence that cannot be readily replaced within 10 years.	Trees that might be included within Category A but are downgraded because of diminished condition such that they are unlikely to be suitable for retention beyond 25 years.	Trees that are visible from surrounding properties and/or the street but make little visual contribution to the wider locality.	Trees with conservation or other cultural value (trees within conservation areas or landscapes described within a statement of significance, locally indigenous species).
Category C			
Trees of Low Quality with an estimated remaining life expectancy of 5–15 years, or young trees that are easily replaceable.	Trees of very limited value or such impaired condition that they do not qualify in higher categories.	Trees offering low or only temporary/transient landscape benefits.	Trees with no material conservation or other cultural value.
Category U			
Trees in such a condition that they cannot realistically be retained as viable trees in the context of the current land use for longer than 5 years.	Trees that have a severe structural defect that are not remediable such that their failure is expected within 12 months. Trees that will become unviable after removal of other Category U trees (e.g. where for whatever reason the loss of companion shelter cannot be mitigated by pruning). Trees that are dead or are showing signs of significant, immediate and irreversible overall decline. Trees infected with pathogens of significance to the health and or safety of other trees nearby Low quality trees suppressing adjacent trees of better quality. Noxious weeds or species categorised as weeds within the local area. Note: Category U trees can have existing or potential conservation value* which might make it desirable to preserve.		

* Where trees would otherwise be categorised as U, B or C but have significant identifiable conservation, heritage or landscape value even though only for the short term, they may be upgraded, although they might be suitable for retention only.

Tree quality

		Health**			
		Excellent/ Good	Fair	Poor	Dead
Structure	Good	A	B	C	U
	Fair	B	B	C	U
	Poor	C	C	U	U
	Hazard *	U	U	U	U

* Structural hazard that cannot be remediated through mitigation works to enable safe retention.

** Trees of short term reduced health that can be remediated via basic, low cost plant health care works (e.g. mulching, irrigation etc.) may be designated in a higher health rating to ensure correct retention value nomination.

Category A	Typically trees in this category are of high quality with an estimated remaining life expectancy of at least 25 years and of dimensions and prominence that it cannot be readily replaced in <20 years. The tree may make significant amenity contributions to the landscape and may make high environmental contributions. In some cases, trees within this category may not meet the above criteria, however possess significant heritage or ecological value. Trees of this retention value warrant design consideration and amendment to ensure their viable retention.
Category B	Typically trees in this category are of moderate quality with an estimated remaining life expectancy of 15–25 years and prominence of size dimensions that cannot be readily replaced within 10 years. They may make moderate amenity contributions to the landscape and make low/moderate environmental contributions. Trees with this retention value warrant lesser design consideration in an attempt to allow for their retention.
Category C	Trees in this category are of low quality with an estimated remaining life expectancy of 5–15 years, or young trees that are easily replaceable, may have poor health and/or structure, are easily replaceable, or are of undesirable species and do not warrant design consideration.
Category U	Trees in this category are found to be in such a condition that they cannot realistically be retained as viable trees in the context of the current land use for longer than five years. These trees may be dead and/or of a species recognised as a weed that resulted in them being unretainable.

Appendix D. Plant health care and mulching

Guide to plant health tonics and root growth stimulants

Considering the varying sizes of trees in common urban landscapes, it is suggested that an application volume of combined water and product solution of 80–150L for small to medium sized trees (5-10m height), 150–250L for medium to large sized trees (10-20m height) and 250–400L for large to very large sized trees (+20m height). Note: a lesser volume of total mixed product could be used if a more concentrated mix is drenched and water irrigation used to further drench the area and therefore dilute the stronger mix application.

The following product recommendations have been based on previous successful works undertaken by ArborSafe. The information provided is to be used as a general guide only, depending on your tree species, health or location. We recommend you always refer to the manufacturers label before applying any product. You may need to further consult with ArborSafe or your Project Arborist to develop a more specific program for your tree needs.

- **Soil conditioner** concentrate such as Kelpro, Seasol or similar 600–800mL/100L of water.
  A concentration of beneficial nutrients stimulating plant growth and root establishment, ideal for trees under stress.
- **Nitrogen boost** concentrate such as Nitrosol liquid plant food or similar 300mL/100L of water.
  A general-purpose fertiliser that contains a nitrogen boost (the most abundantly used element for tree growth).
  NB: Care must be taken when applying general fertiliser, particularly where plants can be affected by phosphorus toxicity e.g. many Australian native plants.
- **Root bio stimulant** concentrate such as Auxinone or similar 400mL/100L of water.
  A scientific blend of hormone root growth stimulants and vitamins assisting in the regeneration of roots.
- **Microbial formulation** concentrate such as Noculate Liquid or similar 500mL/100L of water.
  Generally containing strains of beneficial soil microorganisms, humic acid, kelp, essential amino acids, vitamins, biotin, folic acid and natural sugars designed to enhance the establishment of beneficial microbial populations.
- **Carbohydrate energy source** such as Molasses 500–800mL/100L of water.
  Molasses is the by-product of sugar refining. It contains all the nutrients from the raw sugarcane plant and is a carbohydrate energy source that feeds soil microorganisms and increases microbial activity.
- **Surfactant/wetting agent** (optional) such as Dispatch (Liquid) 200–300ml/100L of water.
  Improves the infiltration and penetration of applied water and irrigation.

We recommend you always refer to the manufacturer's label before applying any product using the above as a guide only.

Guide to mulching and maintenance for established trees

The benefits of correctly applying mulch are often underestimated, extending the useful life expectancy (ULE) of newly planted, young trees and established trees alike. Maintaining a soil environment that is conducive to root growth, development and function is vital in long-term tree retention and viability. This guide provides information on appropriate maintenance practices around the base of trees, including mulching, and the restriction of activities that may cause damage to tree roots and/or trunks.

Why mulch?

Mulching is a plant health care action which can be undertaken to improve plant and soil health (Figure 12), as well as overall landscape aesthetics. Placing an organic (or sometimes inorganic) material on the soil surface reduces the level of direct sunlight contact. Mulching should not be confused with composting which involves incorporating organic matter such as composts or manures into the soil profile. All plants in their natural ecologies (except for some arid and coastal ecologies) are naturally mulched by the falling of leaves, bark, flowers and other organic material.

This action is of great importance in successful cultivation of plants as it:

- assists in the regulation of soil moisture and temperature levels
- helps to suppress weeds
- amends and prevents soil compaction
- reduces water run-off during periods of heavy rain
- promotes soil-microbes and beneficial soil bacteria
- retains ground water content
- prevents lawn mower and vehicle damage to roots
- acts to reduce tree risk by decreasing the number of targets that pass and/or congregate under tree canopies; this in turn minimises the likelihood of injury in the event of a branch failure
- improves the visual aesthetics of the landscape.

Mulch is best comprised of organic materials such as wood chips, leaf litter, straw or hay, as these will degrade over time. Long-term mulching improves soil health and structure as it encourages the activities of earthworms, microflora and beneficial fungi. The addition of inorganic mulch may be useful for drainage qualities, load bearing surfaces, or to prevent root damage, but will not provide the ongoing improvements to soil health.

Figure 12. An excellent example of how to mulch a young tree. Lachlan Andrews, September 2015.

How to mulch

- Apply mulch to damp soil, as placing mulch over dry soil makes it difficult to rehydrate. Applying during the cooler months of the year is an ideal time.
- If mulching on top of a pre-existing grass area, grass or weeds must first be hand weeded and/or sprayed with a non-selective herbicide and left to wilt and die before applying mulch.
- Mulch should be applied at a uniform thickness of 75–100mm and re-applied approximately every 12 months. Do not place mulch up against the trunk of a tree as the damp mulch can cause bark to decay.
- Apply over a wide area, at least as large as a tree's crown projection (preferably larger) where practical, within and outside the current root mass to encourage lateral root development and expansion.
- Wood chip mulch (such as that generated from wood chippers) is considered an ideal mulch for landscape use as it contains a wide variety of materials that are of different sizes (such as bark, foliage and timber), is relatively cheap to purchase, and can be obtained in large quantities. Stockpiling of mulch after tree contractors have conducted works at a site is a way of generating 'free' mulch and ensuring that plant material from tree pruning and/or removals is recycled on site, not imported from external suppliers, saving costs and making the site more self-sustaining.
- The use of mulch made from pine bark or red gum chips are discouraged as they seldom degrade and therefore do not add nutrition to the soil profile. The uniform particle size and resin content can provide an impervious layer to water as well as retarding gaseous exchange.
- Mulching within the canopy areas of larger trees (Figure 13) can not only improve long-term tree health but can also act to reduce tree risk by decreasing the number of targets that pass and/or congregate under their canopies. This in turn will minimise the likelihood of injury in the event of a branch failure.
- When using wood chip mulch, ensure that if it has been made from live plant material that is stored and allowed to compost for between 3 and 6 months prior to use. Never apply fresh, 'green' mulch around trees as this can induce what is called the nitrogen drawdown, which can result in the removal of nitrogen from the soil resulting in plants with nutrient deficiencies.

Types of mulch and uses

All mulch is beneficial however these benefits can be maximised using different mulches for specific applications. Our arborists can provide guidance on mulch for specific applications or purposes.

Coarse mulch or wood chip mulch (such as that generated from wood chippers) is considered an ideal mulch for landscape use as it contains a wide variety of materials that are of different sizes (such as bark, foliage and wood), is relatively cheap to purchase, and can be obtained in large quantities. Stockpiling of mulch after tree contractors have conducted works at a site is economical and mitigates biosecurity risks associated with importing products.

Coarse mulch high in pine bark or red gum chips interlocks together and is ideal for areas prone to wind and water erosion. The larger particles can take longer to degrade, reducing amendment to the soil profile, however, extending the lifespan of particles.

Fine mulch or re-ground mulch is wood chip which has been processed multiple times (up to three) to create a fine product. Fine mulch is more readily available for degradation and will provide soil amendments sooner. The uniform particle size provides a more aesthetic product, however, depending on particle size it can be impervious to water as well as retarding gaseous exchange.

When using wood chip mulch, ensure that if it has been made from live plant material, it is stored and allowed to compost for between 3 to 6 months prior to use. Never apply fresh, 'green' mulch around trees as this can induce what is called *nitrogen drawdown*, which can result in the removal of nitrogen from the soil, resulting in plants with nutrient deficiencies.

For further information refer to the Australian Standard AS 4454–2012: *Composts, Soil Conditioners and Mulches*.

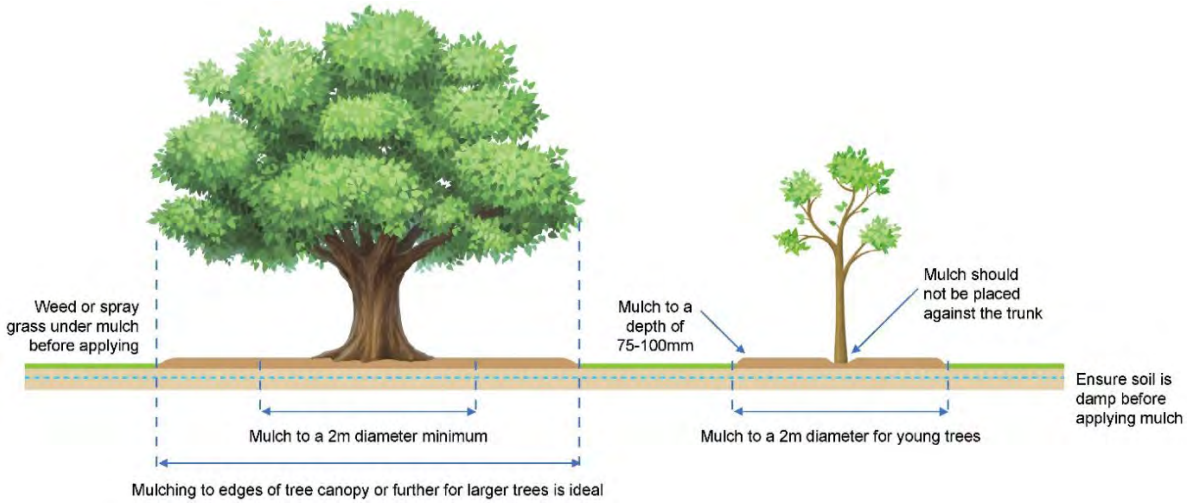

Figure 13. Mulching established and young trees. ArborSafe Australia, 2020.

Root and trunk damage

The function of tree roots is primarily to provide water and nutrient uptake for the tree, provide stability through structural roots that anchor it to the ground and as a means of food and nutrient storage. Damage to tree roots can lead to a reduction to any or all of these functions.

Damage to tree roots (Figure 14 and Figure 15) and the lower portion of a tree's trunk is a common and often unnecessary occurrence that can lead to the entry of decay fungi into a tree's structural framework. Once present, decay may develop in larger structural roots and/or the base of the trunk, which can result in a reduction in tree health and in severe cases even compromise stability.

Works such as trenching and excavation are often the cause of root damage to trees. Refer to ArborSafe's Guide – Tree protection during construction or the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites* for things to consider when performing construction activities near trees.

Everyday activities such as grass cutting via mowing or brush cutters can result in serious root damage or wounding to the lower trunk. Young trees with their trunks damaged by machinery often need replacing, while damage to the trunks and/or surface roots of established trees is not only detrimental to tree health but can also result in costly repairs to machinery.

Another advantage to mulching around the trunk and root crown is that it limits damage to both parts from mowing equipment. This in turn reduces mechanical damage and compaction.

Figure 14. An example of damage to tree roots caused via mowing. Luke Dawson, June 2017.

Figure 15. Image showing wound caused to upper portion of surface root by mower. Luke Dawson, June 2017.

How to avoid root and trunk damage

The following points serve to highlight ways to avoid damage to tree roots and trunks caused via grass cutting activities:

- Mulching around young and established trees negates the need for brush cutter and/or lawn mower use around the base of a tree. Mulching therefore not only creates a barrier between tree roots and trunk that are susceptible to damage, it improves soil condition, minimises soil compaction and decreases the total area required for mowing.
- Where mulching is not feasible, raising the cutting height of mowers and maintaining grass at a greater height can avoid unnecessary 'scalping' of roots and damage to mowers/blades.
- Where surface roots are located away from the trunk and in a location where neither the application of mulch nor the raising of mower height is inappropriate, it may be possible to raise the soil grade directly around the root/s to minimise damage. It is important that the application of new material does not result in significant changes to the soil profile that may inadvertently damage roots. Material applied should be permeable and allow the development of turf which will protect the roots. Coarse sand or a planting mix with a high sand to organic matter ratio (e.g. 80/20 mix) spread at a depth of 75–100mm could suitably protect the surface root from damage, while allowing turf to redevelop within the area.
- Civica ArborSafe is able to answer any questions regarding the material, depth and method of application to be used to ensure the tree/s remain viable for the long-term.

Appendix E. Tree assessment data

Tree no.	*Botanical Name*	Common Name	Origin	Trees in group	DBH Total (cm)	DRB (cm)	Radial TPZ (m)	TPZ area (m2)	Radial SRZ (m)	Tree Height (m)	Canopy (m)	Health	Structure	Age	TLE (Yrs.)	Defects	Significance	Arborist comments	Tree Quality Score	Tree Retention value subcategory	Recommendation
1	*Cupressus sp.*	Cypress	Exotic	1	55	56	6.6	136.85	2.6	5-10	<5	Good	Good	Semi-Mature	>50	Co-dominant stems; Exposed root(s); Included bark; Mechanical damage to root(s);	Amenity value/shade; Avenue tree;	Remove due to direct conflict with proposed waste hardstand.	B		Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
2	*Cupressus sp.*	Cypress	Exotic	1	36	26	4.3	58.63	1.9	5-10	<5	Fair	Good	Young	10-15	Crossing/rubbing branches; Deadwood/stubs > 30mm; Dieback; Included bark; Poor pruning; Soil problems;	Avenue tree;	Remove due to direct conflict with proposed waste hardstand.	C		Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
3	*Ulmus parvifolia*	Chinese Elm	Exotic	1	44	47	5.3	87.58	2.4	10-15	10-15	Good	Fair	Semi-Mature	25-50	Co-dominant stems; Crossing/rubbing branches; Epicormic growth; Exposed root(s); Poor pruning; Previous failure(s); Soil compaction;	Amenity value/shade; Avenue tree;	Remove due to direct conflict with proposed waste hardstand.	B		Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
4	*Ulmus parvifolia*	Chinese Elm	Exotic	1	29	37	3.5	38.05	2.2	5-10	10-15	Good	Good	Juvenile	>50	Deadwood/stubs < 30mm; Epicormic growth; Poor pruning; Suppressed;	Amenity value/shade; Avenue tree;	Remove due to direct conflict with proposed waste hardstand.	B		Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
5	*Corymbia maculata*	Spotted Gum	Native	1	50	73	6.0	113.10	2.9	15-20	5-10	Good	Good	Semi-Mature	>50	Deadwood/stubs < 30mm;	Attractive landscape feature; Amenity value/shade; Avenue tree;	Remove due to direct conflict with proposed waste hardstand.	A		Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
6	*Ulmus parvifolia*	Chinese Elm	Exotic	1	45	60	5.4	91.61	2.7	10-15	10-15	Good	Fair	Semi-Mature	25-50	Crossing/rubbing branches; Deadwood/stubs < 30mm; Epicormic growth; Exposed root(s);	Amenity value/shade; Avenue tree;	Remove due to direct conflict with proposed waste hardstand.	B		Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
7	*Ulmus parvifolia*	Chinese Elm	Exotic	1	30	50	3.6	40.72	2.5	10-15	10-15	Good	Good	Semi-Mature	25-50	Crossing/rubbing branches; Deadwood/stubs < 30mm; Epicormic growth; Exposed root(s); Suppressed;	Amenity value/shade; Avenue tree;	Remove due to direct conflict with proposed waste hardstand.	B		Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
8	*Ulmus parvifolia*	Chinese Elm	Exotic	1	38	68	4.5	63.74	2.8	10-15	10-15	Good	Fair	Semi-Mature	25-50	Crossing/rubbing branches; Deadwood/stubs > 30mm; Epicormic growth; Exposed root(s); Included bark;	Amenity value/shade; Avenue tree; Attractive landscape feature;		B		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
9	*Lophostemon confertus*	Queensland Box	Native	1	81	96	9.7	296.81	3.3	10-15	10-15	Good	Good	Mature	>50	Co-dominant stems; Deadwood/stubs < 30mm;	Amenity value/shade; Attractive landscape feature;		A		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
10	*Acacia sp.*	Wattle	Native	1	46	74	5.5	95.73	2.9	10-15	5-10	Fair	Fair	Mature	15-25	Co-dominant stems; Deadwood/stubs > 60mm; Exposed root(s); Included bark; Mechanical damage to root(s); Previous failure(s);	Amenity value/shade;		B		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
11	*Callistemon salignus*	Willow Bottlebrush	Endemic	1	25	44	3.0	28.86	2.3	5-10	<5	Good	Fair	Mature	10-15	Cavity(s); Co-dominant stems; Included bark;	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
12	*Syzygium paniculatum*	Magenta Brush Cherry	Endemic	1	31	33	3.7	43.47	2.1	5-10	5-10	Good	Good	Semi-Mature	25-50	Co-dominant stems; Epicormic growth; Exposed root(s); Included bark; Mechanical damage to root(s);	Amenity value/shade; Attractive landscape feature;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
13	*Eucalyptus saligna*	Sydney Blue Gum	Endemic	1	44	71	5.3	87.58	2.9	15-20	10-15	Good	Good	Semi-Mature	>50	Bird browsing damage; Deadwood/stubs > 30mm; Epicormic growth; Exposed root(s); Included bark; Mechanical damage to root(s);	Amenity value/shade; Attractive landscape feature;		A		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
14	*Callistemon viminalis*	Weeping Bottlebrush	Native	1	24	60	2.9	26.37	2.7	<5	<5	Good	Fair	Semi-Mature	15-25	Co-dominant stems; Crossing/rubbing branches; Epicormic growth; Included bark; Poor pruning;	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
15	*Banksia integrifolia*	Coast Banksia	Endemic	1	33	48	4.0	49.99	2.4	5-10	5-10	Good	Good	Semi-Mature	25-50	Co-dominant stems; Epicormic growth; Exposed root(s); Hanger(s); Mechanical damage to root(s); Wound(s);	Amenity value/shade;		B		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
16	*Casuarina cunninghamiana*	River She-oak	Endemic	1	23	33	2.8	23.93	2.1	5-10	<5	Good	Fair	Juvenile	15-25	Co-dominant stems; Epicormic growth; Previous failure(s); Wound(s);	Amenity value/shade;		B		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
17	*Liquidambar styraciflua*	Sweet Gum	Exotic	1	22	31	2.6	21.90	2.0	5-10	<5	Good	Fair	Juvenile	15-25	Epicormic growth; Exposed root(s); Mechanical damage to root(s); Previous failure(s); Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
18	*Liquidambar styraciflua*	Sweet Gum	Exotic	1	31	46	3.7	43.88	2.4	5-10	5-10	Good	Fair	Juvenile	15-25	Epicormic growth; Exposed root(s); Mechanical damage to root(s); Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
19	*Casuarina glauca*	Swamp she-oak	Endemic	1	40	52	4.8	72.38	2.5	10-15	5-10	Good	Fair	Semi-Mature	15-25	Epicormic growth; Exposed root(s); Mechanical damage to root(s); Wound(s);	Active nesting by fauna; Amenity value/shade;		B		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
20	*Casuarina glauca*	Swamp she-oak	Endemic	1	21	31	2.5	19.95	2.0	10-15	<5	Good	Fair	Juvenile	15-25	Epicormic growth; Exposed root(s); Included bark; Mechanical damage to root(s); Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
21	*Casuarina glauca*	Swamp she-oak	Endemic	1	30	44	3.6	40.72	2.3	10-15	5-10	Good	Fair	Semi-Mature	15-25	Epicormic growth; Exposed root(s); Mechanical damage to root(s); Previous failure(s); Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
22	*Casuarina glauca*	Swamp she-oak	Endemic	1	35	69	4.2	55.42	2.8	10-15	5-10	Good	Fair	Semi-Mature	15-25	Co-dominant stems; Epicormic growth; Exposed root(s); Mechanical damage to root(s); Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
23	*Casuarina glauca*	Swamp she-oak	Endemic	1	19	30	2.3	16.33	2.0	10-15	<5	Good	Fair	Semi-Mature	15-25	Deadwood/stubs < 30mm; Epicormic growth; Exposed root(s); Mechanical damage to root(s); Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
24	*Lophostemon confertus*	Queensland Box	Native	1	45	55	5.4	91.61	2.6	5-10	10-15	Good	Poor	Semi-Mature	10-15	Co-dominant stems; Deadwood/stubs < 30mm; Decay; Epicormic growth; Mechanical damage to root(s); Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
25	*Lophostemon confertus*	Queensland Box	Native	1	71	83	8.5	228.05	3.1	10-15	10-15	Good	Fair	Semi-Mature	15-25	Co-dominant stems; Deadwood/stubs > 100mm; Epicormic growth; Exposed root(s); Mechanical damage to root(s); Previous failure(s); Wound(s);	Amenity value/shade;		B		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
26	*Pinus sp.*	Pine	Exotic	1	45	51	5.4	91.61	2.5	10-15	10-15	Dead	Fair	Semi-Mature	0	Co-dominant stems; Deadwood/stubs > 100mm; Exposed root(s); Mechanical damage to root(s);			U		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
27	*Glochidion ferdinandi*	Cheese Tree	Endemic	1	40	71	4.8	73.15	2.9	5-10	10-15	Fair	Fair	Semi-Mature	10-15	Co-dominant stems; Crossing/rubbing branches; Deadwood/stubs < 30mm; Exposed root(s); Mechanical damage to root(s); Pests/insects; Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
28	*Glochidion ferdinandi*	Cheese Tree	Endemic	1	62	79	7.4	173.90	3.0	5-10	10-15	Good	Fair	Mature	15-25	Co-dominant stems; Crossing/rubbing branches; Deadwood/stubs > 30mm; Exposed root(s); Mechanical damage to root(s); Pests/insects; Wound(s);	Amenity value/shade;		B		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
29	*Glochidion ferdinandi*	Cheese Tree	Endemic	1	35	47	4.2	55.42	2.4	5-10	5-10	Good	Fair	Semi-Mature	10-15	Crossing/rubbing branches; Deadwood/stubs > 30mm; Exposed root(s); Mechanical damage to root(s); Pests/insects; Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
30	*Glochidion ferdinandi*	Cheese Tree	Endemic	1	26	38	3.2	31.58	2.2	5-10	5-10	Good	Fair	Semi-Mature	10-15	Co-dominant stems; Crossing/rubbing branches; Deadwood/stubs > 30mm; Epicormic growth; Exposed root(s); Mechanical damage to root(s); Pests/insects; Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
31	*Prunus sp.*	Cherry	Exotic	1	25	55	3.0	28.27	2.6	<5	5-10	Good	Poor	Semi-Mature	5-10	Co-dominant stems; Crossing/rubbing branches; Deadwood/stubs > 60mm; Epicormic growth; Previous failure(s); Weak union(s); Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
32	*Eucalyptus melliodora*	Yellow Box	Native	1	62	67	7.4	173.90	2.8	10-15	10-15	Good	Fair	Mature	>50	Co-dominant stems; Deadwood/stubs < 30mm; Previous failure(s); Wound(s);	Amenity value/shade; Attractive landscape feature;		B		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).

Tree no.	*Botanical Name*	Common Name	Origin	Trees in group	DBH Total (cm)	DRB (cm)	Radial TPZ (m)	TPZ area (m2)	Radial SRZ (m)	Tree Height (m)	Canopy (m)	Health	Structure	Age	TLE (Yrs.)	Defects	Significance	Arborist comments	Tree Quality Score	Tree Retention value subcategory	Recommendation
33	*Eucalyptus microcorys*	Tallowwood	Endemic	1	59	75	**7.1**	157.48	**2.9**	10-15	10-15	Good	Fair	Mature	25-50	Co-dominant stems; Crossing/rubbing branches; Deadwood/stubs > 30mm; Epicormic growth; Poor pruning; Previous failure(s); Wound(s);	Amenity value/shade; Attractive landscape feature;	Major TPZ encroachment, calculated at 15%, during construction of new carpark entry and expanded Council footpath. Mulch & plant health care.	B		Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
34	*Ulmus parvifolia*	Chinese Elm	Exotic	1	44	48	**5.3**	87.58	**2.4**	10-15	10-15	Good	Fair	Mature	15-25	Co-dominant stems; Crossing/rubbing branches; Deadwood/stubs > 30mm; Epicormic growth; Exposed root(s); Hanger(s); Poor pruning; Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
35	*Eucalyptus racemosa*	Scribbly Gum	Endemic	1	47	65	**5.7**	100.70	**2.8**	10-15	5-10	Good	Fair	Semi-Mature	25-50	Co-dominant stems; Crossing/rubbing branches; Deadwood/stubs < 30mm; Epicormic growth; Poor pruning; Wound(s);	Amenity value/shade; Attractive landscape feature;		B		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
36	*Lophostemon confertus*	Queensland Box	Native	1	56	67	**6.7**	141.19	**2.8**	10-15	10-15	Good	Good	Semi-Mature	>50	Co-dominant stems; Crossing/rubbing branches; Deadwood/stubs < 30mm; Epicormic growth; Poor pruning; Wound(s);	Amenity value/shade;		B		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
37	*Lophostemon confertus*	Queensland Box	Native	1	61	69	**7.3**	168.33	**2.8**	10-15	10-15	Good	Good	Semi-Mature	>50	Co-dominant stems; Crossing/rubbing branches; Damaging infrastructure; Deadwood/stubs < 30mm; Epicormic growth; Soil problems;	Amenity value/shade;	Within a small planting pit.	B		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
38	*Cinnamomum camphora*	Camphor Laurel	Exotic	1	80	80	**9.6**	289.53	**3.0**	10-15	10-15	Good	Good	Semi-Mature	>50	Co-dominant stems; Deadwood/stubs > 30mm; Dieback; Epicormic growth; Poor pruning; Undesirable species;	Weed species;		B		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
39	*Lophostemon confertus*	Queensland Box	Native	1	23	34	**2.8**	24.61	**2.1**	5-10	<5	Fair	Poor	Juvenile	<5	Damaging infrastructure; Deadwood/stubs < 30mm; Exposed root(s); Mechanical damage to root(s); Suppressed; Wound(s);			U		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
40	*Cinnamomum camphora*	Camphor Laurel	Exotic	1	58	63	**6.9**	149.61	**2.7**	10-15	10-15	Fair	Fair	Semi-Mature	25-50	Co-dominant stems; Deadwood/stubs > 30mm; Dieback; Epicormic growth; Poor pruning; Suckers; Undesirable species;	Weed species;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
41	*Lophostemon confertus*	Queensland Box	Native	1	73	75	**8.8**	241.08	**2.9**	10-15	10-15	Good	Good	Semi-Mature	25-50	Co-dominant stems; Deadwood/stubs < 30mm; Wound(s);	Amenity value/shade;		B		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
42	*Lophostemon confertus*	Queensland Box	Native	1	128	146	**15.0**	706.86	**3.9**	20-30	20-30	Good	Good	Mature	>50	Co-dominant stems; Crossing/rubbing branches; Deadwood/stubs < 30mm; Previous failure(s); Wound(s);	Amenity value/shade; Attractive landscape feature; Dominant landscape feature; Particularly old/venerable; Significant due to age/size;	Care required during demolition/removal of existing buildings	A		Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
43	*Lophostemon confertus*	Queensland Box	Native	1	57	67	**6.9**	147.71	**2.8**	10-15	10-15	Good	Good	Semi-Mature	25-50	Co-dominant stems; Deadwood/stubs < 30mm; Girdling root(s); Wound(s);	Amenity value/shade;	Care required during demolition/removal of existing buildings	B		Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
44	*Melaleuca linariifolia*	Snow in Summer	Endemic	1	31	39	**3.7**	43.47	**2.2**	5-10	<5	Good	Good	Semi-Mature	15-25	Deadwood/stubs < 30mm; Epicormic growth; Wound(s);	Amenity value/shade;	Care required during demolition/removal of existing buildings	C		Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
45	*Dead Tree*	Dead tree			32	35	**3.9**	47.41	**2.1**	5-10	5-10	Dead	Poor	Semi-Mature	0	Co-dominant stems; Deadwood/stubs > 100mm;		Direct footprint conflict with proposed Library	U		Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
46	*Tristaniopsis laurina*	Kanooka			25	32	**3.0**	28.64	**2.1**	5-10	5-10	Good	Good	Semi-Mature	25-50	Co-dominant stems; Deadwood/stubs < 30mm; Dieback; Epicormic growth;	Amenity value/shade;	Direct footprint conflict with proposed Library	C		Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
47	*Pistacia chinensis*	Chinese Pistachio			31	35	**3.8**	44.61	**2.1**	5-10	5-10	Good	Fair	Semi-Mature	15-25	Co-dominant stems; Crossing/rubbing branches; Deadwood/stubs < 30mm; Epicormic growth;	Amenity value/shade;	Direct footprint conflict with proposed Library	C		Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
48	*Callistemon salignus*	Willow Bottlebrush			47	49	**5.6**	99.93	**2.5**	10-15	5-10	Good	Fair	Semi-Mature	15-25	Crossing/rubbing branches; Deadwood/stubs < 30mm; Epicormic growth; Included bark;	Amenity value/shade;	Minor TPZ encroachment from proposed Library building, associated footpath and proposed storm water pit and connection pipe. Encroachment calculated at approx 10%, to edge of proposed concrete footpath.	B		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
49	*Pinus radiata*	Monterey Pine			86	88	**10.3**	334.59	**3.1**	15-20	15-20	Fair	Fair	Mature	10-15	Crossing/rubbing branches; Deadwood/stubs < 30mm; Epicormic growth; Exposed root(s); Included bark; Mechanical damage to root(s); Resin exudation/kino; Wound(s);	Amenity value/shade;	Major TPZ encroachment with proposed Library	C		Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
50	*Syzygium leuhmannii*	Small-leaved Lilly Pilly			43	46	**5.2**	83.65	**2.4**	10-15	10-15	Good	Good	Mature	25-50	Co-dominant stems; Crossing/rubbing branches; Deadwood/stubs < 30mm; Epicormic growth; Wound(s);	Amenity value/shade;	Minor TPZ encroachment (10%) from new library building but major TPZ Encroachment (20%) when new footpath is included. Proposed storm water pit situated outside TPZ. Footpath to be constructed above grade across TPZ, Plant health care & irrigation as required to enhance remaining TPZ area.	B		Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
51	*Eucalyptus scoparia*	Wallangarra White Gum			35	41	**4.2**	55.42	**2.3**	10-15	10-15	Fair	Fair	Semi-Mature	15-25	Crossing/rubbing branches; Deadwood/stubs > 30mm; Epicormic growth; Included bark; Resin exudation/kino; Suckers; Wound(s);	Amenity value/shade;	Direct footprint conflict with proposed Library	C		Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
52	*Syzygium leuhmannii*	Small-leaved Lilly Pilly			42	44	**5.1**	81.29	**2.3**	10-15	10-15	Good	Good	Mature	25-50	Co-dominant stems; Crossing/rubbing branches; Deadwood/stubs < 30mm; Epicormic growth; Wound(s);	Amenity value/shade;	TPZ encroachment on outer sth wst aspect (approx 15%) due to foot print conflict with entrance footpath. Arborist supervision and Plant health care & irrigation as required to enhance remaining TPZ area.	B		Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
53	*Melaleuca quinquenervia*	Broad-leaved Paperbark			63	69	**7.5**	177.56	**2.8**	10-15	10-15	Good	Good	Mature	25-50	Co-dominant stems; Crossing/rubbing branches; Deadwood/stubs > 30mm; Epicormic growth; Hanger(s); Included bark; Wound(s);	Amenity value/shade;	Above grade existing Sub-station pad situated within TPZ. Arb supervision during installation of new underground power cables from substation to school buildings.	B		Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
54	*Pinus radiata*	Monterey Pine			61	70	**7.3**	168.33	**2.8**	15-20	10-15	Fair	Fair	Mature	10-15	Co-dominant stems; Crossing/rubbing branches; Deadwood/stubs > 60mm; Epicormic growth; Excessive thinning; Undesirable species;	Weed species;	Exotic species in declining health. Demountable buildings will be situated above ground on piers meaning minimal impact to TPZ area. Above grade existing Sub-station pad situated within TPZ. Arb supervision during installation of new underground power cables from substation to school buildings.	C		Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
55	*Quercus robur*	English Oak			38	39	**4.6**	65.37	**2.2**	5-10	10-15	Fair	Fair	Semi-Mature	10-15	Co-dominant stems; Dieback; Epicormic growth;	Amenity value/shade;	Care required during installation and removal of demountables.	C		Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
56	*Liquidambar styraciflua*	Sweet Gum				11			**1.5**	<5	<5	Good	Poor	Young	10-15	Suckers;			U		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
57	*Brachychiton acerifolius*	Illawarra Flame Tree			12	15	**2.0**	12.57	**1.5**	5-10	<5	Fair	Good	Juvenile	15-25	Dieback;			C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
58	*Brachychiton acerifolius*	Illawarra Flame Tree			12	15	**2.0**	12.57	**1.5**	5-10	<5	Fair	Good	Juvenile	15-25	Dieback;			C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
59	*Lophostemon confertus*	Queensland Box			83	85	**10.0**	311.65	**3.1**	10-15	10-15	Good	Good	Mature	>50	Co-dominant stems; Deadwood/stubs < 30mm; Epicormic growth;	Amenity value/shade; Screen value;	Care required during removal of existing demountables.	B		Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
60	*Lophostemon confertus*	Queensland Box			70	85	**8.4**	221.67	**3.1**	10-15	10-15	Good	Good	Mature	>50	Co-dominant stems; Deadwood/stubs < 30mm; Epicormic growth;	Amenity value/shade; Screen value;	Care required during removal of existing demountables.	B		Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
61	*Lophostemon confertus*	Queensland Box			45	57	**5.4**	91.61	**2.6**	10-15	10-15	Good	Good	Mature	>50	Co-dominant stems; Deadwood/stubs < 30mm; Epicormic growth;	Amenity value/shade; Screen value;	Care required during removal of existing demountables.	B		Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).

Tree no.	*Botanical Name*	Common Name	Origin	Trees in group	DBH Total (cm)	DRB (cm)	Radial TPZ (m)	TPZ area (m2)	Radial SRZ (m)	Tree Height (m)	Canopy (m)	Health	Structure	Age	TLE (Yrs.)	Defects	Significance	Arborist comments	Tree Quality Score	Tree Retention value subcategory	Recommendation
62	*Lophostemon confertus*	Queensland Box			55	67	**6.6**	136.85	**2.8**	10-15	10-15	Good	Good	Mature	>50	Co-dominant stems; Deadwood/stubs < 30mm; Epicormic growth;	Amenity value/shade; Screen value;	Care required during removal of existing demountables.	B		Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
63	*Lophostemon confertus*	Queensland Box			54	66	**6.5**	131.06	**2.8**	10-15	10-15	Good	Good	Mature	>50	Co-dominant stems; Deadwood/stubs < 30mm; Epicormic growth;	Amenity value/shade; Screen value;	Care required during removal of existing demountables.	B		Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
64	*Lophostemon confertus*	Queensland Box			44	55	**5.3**	87.58	**2.6**	10-15	10-15	Good	Good	Mature	>50	Co-dominant stems; Deadwood/stubs < 30mm; Epicormic growth;	Amenity value/shade; Screen value;	Care required during removal of existing demountables.	B		Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
65	*Lophostemon confertus*	Queensland Box			45	56	**5.4**	91.61	**2.6**	10-15	10-15	Good	Good	Mature	>50	Co-dominant stems; Deadwood/stubs < 30mm; Epicormic growth; Exposed root(s); Mechanical damage to root(s);	Amenity value/shade; Screen value;	Care required during removal of existing demountables.	B		Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).

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