New High School in Bungendore: Arboricultural Impact Assessment

School Infrastructure NSW

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Abbreviations

Abbreviation	Description
AQF	Australian Qualifications Framework
AS	Australian Standards
DBH	Diameter at Breast Height
ELA	Eco Logical Australia
m	Metre
mm	Millimetre
NDE	Non-Destructive Excavation
NO	Number
NSW	New South Wales
SP	Species
SRZ	Structural Root Zone
TPZ	Tree Protection Zone
VTA	Visual Tree Assessment

1. Introduction

1.1 Background

This Arboricultural Impact Assessment (AIA) accompanies an Environmental Impact Statement (EIS) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) in support of an application for a State Significant Development (SSD No 14394209). The SSDA is for a new high school located at Bungendore.

This report addresses the Secretary's Environmental Assessment Requirements (SEARs), notably as follows in Table 1:

Table 1: SEARs

SEARs requirements	Response
3. Trees and Landscaping • where relevant, an arboricultural impact assessment prepared by a Level 5 (Australian Qualifications Framework) Arborist, which details the number, location and condition of trees to be removed and retained, includes detailed justification for each tree to be removed and details the existing canopy coverage on-site.	An AQF Level 5 Consulting Arborist has assessed each tree.

1.2 Proposal

The proposed development is for the construction of a new high school in Bungendore. The proposal has been designed as a stream 3 high school to initially provide for approximately 450 students with core 4 facilities aimed to future proof demand forecasted to 2036.

The site is located adjacent to the existing Bungendore Public School to the south enabling the creation of an education style precinct that will enable a cohesive connection between the two schools as well as the wider Bungendore community.

The proposal will include the demolition of the Bungendore Swimming Pool (to be relocated to Queanbeyan-Palerang Regional Council's proposed new Bungendore Sports Hub) and the Bungendore Community Centre; repurposing of existing council buildings; and the construction of new school buildings. New facilities for the high school will comprise of 24 general learning spaces; dedicated science and technology spaces; a gymnasium; library; canteen; outdoor learning and play areas that include two games courts.

A new agricultural plot is also proposed to the north of the main school site including a new agricultural building and scout storage shed, adjacent to the existing scout hall.

The proposal will also provide for shared administration and staff facilities between the high school and existing primary school and construction of a warm shell for community facilities including a community library, council shopfront and community health hub.

Additionally, miscellaneous off-site works, including upgrades to nearby road intersections and infrastructure, crossings, footpaths and the like will be provided to encourage active transport opportunities and respond to changing traffic conditions.

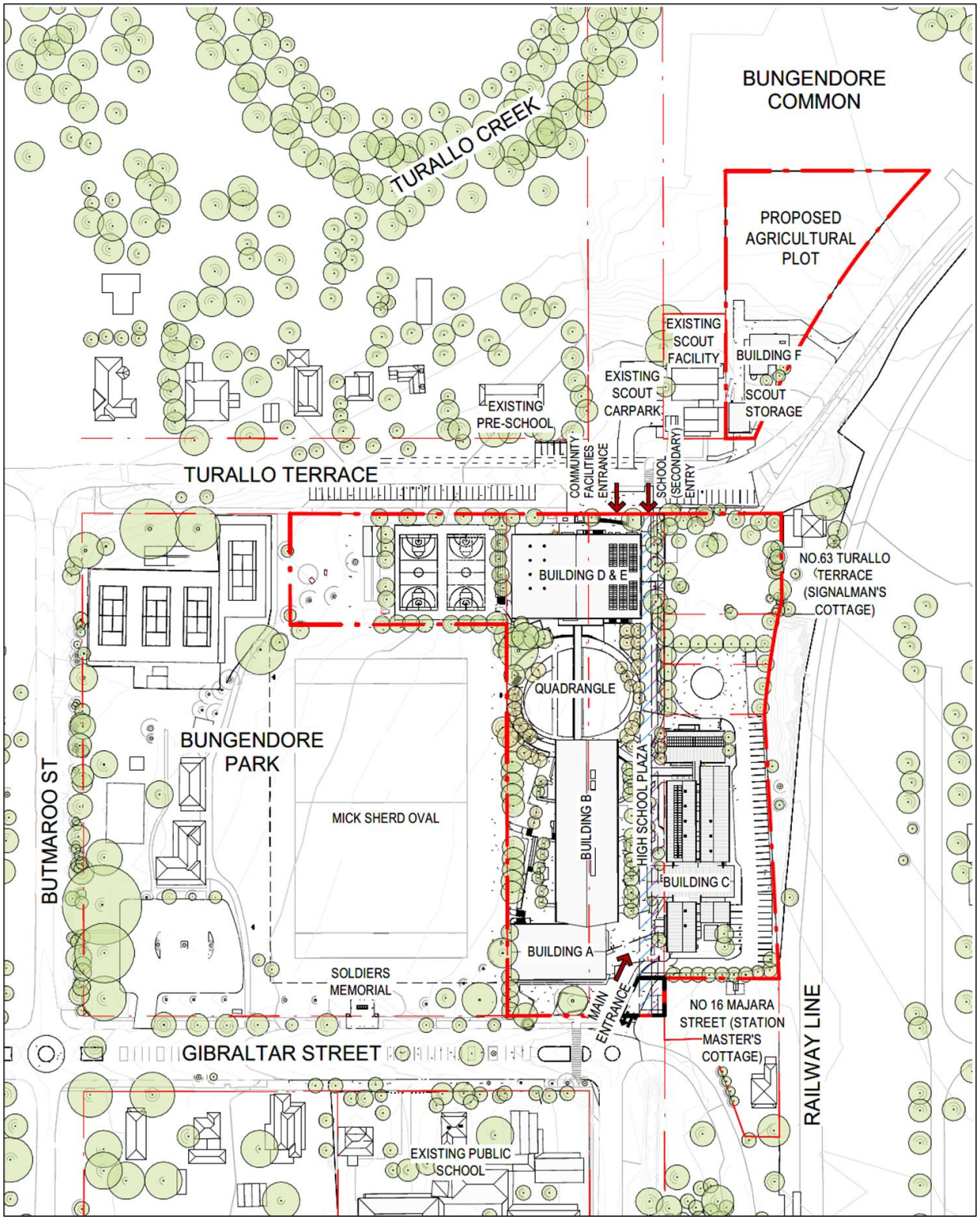

Figure 1: Proposed site plan (Source: TKD Architects)

1.3 Site description

The proposed development is located within the Bungendore Town Centre within the local government area of Queanbeyan-Palerang Regional Council. The proposal involves the use of land which includes Bungendore Park bounded by Gibraltar St, Majara Street, Turallo Terrace and Butmaroo St (Mick Sherd Site), the existing former Palerang Council site at 10 Majara Street, the Majara Street road reserve bounded by Turallo Terrace and Gibraltar Streets and Nos. 2, 4 and 6 Majara Street (Refer to Table 3 below).

The site is approximately 29,205 m^2 in area and consists of a relatively flat topography. It contains part of Bungendore Park, existing Council buildings and maintained public open space areas. The land is mostly cleared of vegetation with some mature trees interspersed throughout subject lots. The existing canopy cover within the proposed high school site (Figure 2 & 3) is approximately 11%.

The surrounding area generally includes low density residential developments to the north and west, an existing rail line to the east and Bungendore Public School and the Bungendore train station to the south and south west respectively.

Table 2: New high school in Bungendore legal descriptions

Property Address	Lot/DP	Area (m^2)
6-14 Butmaroo Street	Part Lot 701 DP 1027107	11 700 m^2
2 Majara Street	Lot 12 DP 113967	1 903 m^2
4-6 Majara Street	Lot 13 and 14 DP 1139067	1 724 m^2
10 Majara Street	Lot 3 DP 830878	4 571 m^2
Butmaroo Street	Part of Lot 701 DP 96240	Approx. 4 500 m^2
Portion of Majara Street between Turallo Terrace and Gibraltar Street	N/A	N/A

1.4 Purpose and aims

The report has been prepared in accordance with the Australian Standards *AS 4970–2009 Protection of trees on development sites.*

The purpose of this report is to:

- Address SEARs requirement 3 outlined in Table 1
- identify the trees within the site that are likely to be affected by the proposed works
- undertake a visual tree assessment of the subject trees
- assess the current overall health and condition of the subject trees
- evaluate the retention value of the subject trees
- identify trees to be removed, retained or transplanted
- determine the likely impacts on trees to be retained
- recommend tree protection measures to minimise adverse impacts and for amendments to the design or construction methodology where necessary to minimise any adverse impact.

Figure 2: Site aerial depicting the land subject to the proposed High School (Source: TKD Architects)

A summary of the proposed activity is outlined in Table 3 and is based on information available at the time of preparing this report. Results of mapping and field investigations reflect changes in the proposed development footprint during this study.

Table 3: Proposed activity

Activities that can impact trees	Description of proposed activities
Clearing vegetation	Yes, a total of 76 trees are proposed to be cleared
Pruning vegetation	No
Earthworks including regrading, excavation and trenching • For building • For services	Yes- • demolition of the Bungendore Community Centre and Bungendore Swimming Pool (to be relocated to the new Bungendore Sports Hub) • New facilities for the high school will include 24 general learning spaces and three support classrooms for science, technology and general learning, a new gymnasium, library, canteen, outdoor learning and play areas including two new games courts • new agricultural plot
Compaction	Yes, all compaction, material storage, installation of structures, stockpiling, onsite parking and vehicle access is to be outside of trees to be retained.
Refuelling and chemical use (e.g. herbicides)	Yes
Erection of scaffolding	Yes
Vehicle movements	Yes
Changes to stormwater management	No
Landscaping	Yes, the proposed landscaping will comprise new game courts, campus paving, concrete stairs and seating, paved pedestrian pathways, shade structures, turf embankments and a carpark as outlined in Appendix H.

Figure 3: Proposed High School site location

2. Method

2.1 Definition of a tree

A tree is defined under the Australian Standard*, AS 4970-2009, Protection of Trees on Development Sites* as a long lived woody perennial plant greater than (or usually greater than) 3 m in height with one or relatively few main stems or trunks.

The Queanbeyan-Palerang Regional Council Development Control Plan (2012) defines a tree dependant on which land zone the tree is located in. Subject trees were located within land zones RE1 (public Recreation), SP2 (Special Use) and R2 (Rural Landscaping). These land zones define a tree as:

'both native and exotic having a height of 6 m or greater; or a canopy spread of 3 m or greater' (Queanbeyan-Palerang Regional Council 2012).

2.2 Visual tree assessment

The subject trees were assessed in accordance with a stage one visual tree assessment (VTA) as formulated by Mattheck and Breloer (1994) and practices consistent with modern arboriculture.

A total of **171 subject trees** were inspected in July 2020 by AQF Level 5 Consulting Arborist, Jessica Lawn.

The following limitations apply to this methodology:

- Trees were inspected from ground level, without the use of any invasive or diagnostic tools and testing.
- Trees were inspected within limits of site access.
- The locations of the subject trees were recorded using hand-held GPS units. Therefore, tree locations were moved using GIS map techniques to the Project Surveyors locations (2021) where possible or to Nearmap satellite imagery (2017) as outlined in Appendix C.
- No aerial inspections or root mapping was undertaken.
- Tree heights, canopy spread and diameter at breast height (DBH) were estimated, unless otherwise stated.
- Tree identification was based on broad taxonomical features present and visible from ground level at the time of inspection.

2.3 Tree health and condition

Tree health and condition evaluation is based on knowledge and experience in the field in addition to section 2.3.2 Preliminary Tree Assessment from the *AS 4970 2009 Protection of trees on development sites* and other commonly used assessment methods which can be found in Appendix E of the Australian Standard including Arboriculture: integrated management of landscape trees, shrubs, and vines (Harris 1999) and Institute of Australian Consulting Arboriculturists (IACA) Significance of a Tree, Assessment Rating System (STARS), Institute of Australian Consulting (IACA 2010).

The criteria to determine tree health is based on numerous characteristics including:

- Live Crown Ratio
- Foliage Colour & density %
- Annual shoot growth/Dieback
- Wound wood development
- Vigour class
- Pests and diseases
- Growth obstructions
- Site Conditions
- Tree root defects including root rot, exposed roots, girdling, restricted root area
- Crown defects including poor taper, codominant stems, multiple attachments, included bark, excessive end weight (Lions tail), cracks, splits, hangers, wounds, decay, cavities, fungi present, kino - sap flow, loose or cracked bark, deadwood, borers, cankers galls and burls and previous failures and injuries.

2.4 Retention value

The retention value or importance of a tree or group of trees, is determined in accordance with the Institute of Australian Consulting Arborists (IACA) Significance of a Tree Assessment Rating System (STARS©), which is summarised in Appendix A. The method considers the Safe Useful Life Expectancy (ULE) and landscape significance of a tree. Trees are provided one of the following ratings:

- **High - priority for retention**. These trees are considered important and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by Australian Standard *AS 4970–2009 Protection of trees on development sites.*
- **Medium - consider for retention.** These trees are moderately important for retention. Their removal should only be considered if adversely affected by the proposed works and all other alternatives have been considered and exhausted.
- **Low - consider for removal**. These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
- **Priority for removal:** These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

2.5 Protection zones

2.5.1 Tree protection zone (TPZ)

The TPZ is a specific area above and below ground and at a distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by the development. The radius of the TPZ is calculated for each tree by multiplying its DBH (trunk diameter measures at 1.4 m above ground) x 12. The radius is measured from the centre of the stem at ground level.

The TPZ (as defined by AS 4970-2009) requires restriction of access during the development process. Groups of trees with overlapping TPZs may be included within a single protection area. Tree sensitive measures must be implemented if works are to proceed within the TPZ.

2.5.2 Structural root zone (SRZ)

The SRZ is the area of the root system (as defined by AS 4970-2009) used for stability, mechanical support and anchorage of the tree. It is critical for the support and stability of trees. Severance of roots within the SRZ is not recommended as it may lead to the destabilisation and/or decline of the tree.

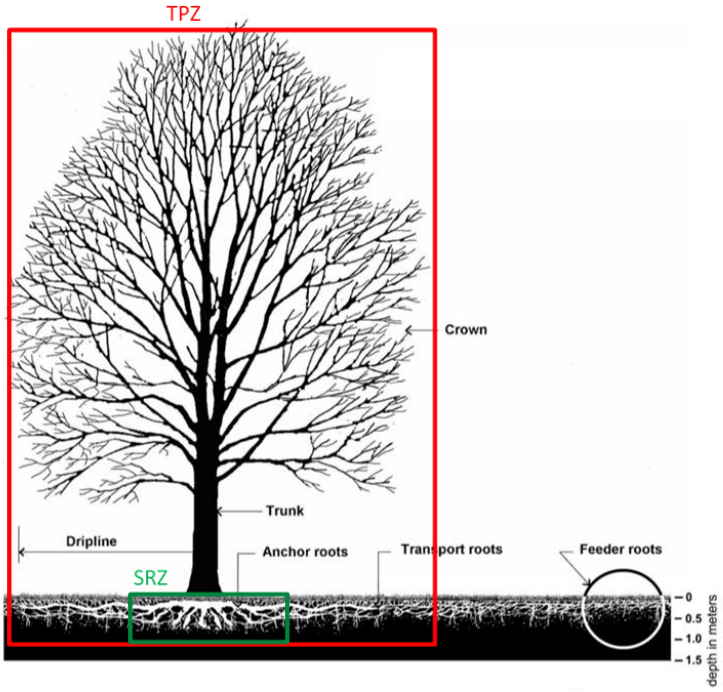

Figure 4: Representative tree structure and indicative TPZ and SRZ

2.6 Potential impacts

Trees may be impacted by physical or chemical damage to roots or above tree parts. Examples include impacts associated with site grading, soil compaction, excavation, stock piling within TPZ as well as changes in site hydrology, changes in soil level and site contamination. The extent of encroachment to the TPZ and SRZ determines the level of potential impact. AS 4970-2009 defines types of encroachment as follows and as illustrated in Appendix B:

- **Major encroachment** - If the proposed encroachment is greater than 10% of the TPZ or inside the SRZ, the project arborist must demonstrate that the tree(s) would remain viable. The location and distribution of roots may be determined through non-destructive excavation (NDE) methods such as hydro-vacuum excavation (sucker truck), Air Spade or manual extraction. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ.

- **Minor encroachment** – If the proposed encroachment is less than 10% of the TPZ, and outside of the SRZ, detailed root investigations should not be required. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ.

For the purposes of this Arboricultural Impact Assessment, impacts are defined as follows:

- **High impact:** The SRZ is directly affected or the proposed encroachment is greater than 20% of the TPZ. Trees may not remain viable if they are subject to high impact. These trees cannot be retained unless the proposal is changed.
- **Medium impact:** If the proposed encroachment is greater than 10% of the TPZ (but less than 20% of the TPZ) and outside of the SRZ, the project arborist may require detailed root investigation to demonstrate that the tree(s) would remain viable. These trees may be retained subject to further investigation and mitigation measures.
- **Low impact:** If the proposed encroachment is less than 10% (total area) of the TPZ, and outside of the SRZ, detailed root investigations should not be required. These trees can be retained.
- **No impact:** No likely or foreseeable encroachment within the TPZ. These trees can be retained.

Impacts are calculated using geographic information systems techniques.

2.7 Proposed action

The proposed actions to either retain or remove each tree are determined by the impact from the proposed design footprint, conversations of intent with the client and corresponding mitigation measures. The following are the definition of these actions:

- **Remove:** Trees that are to be impacted by the proposed development to the extent whereby retention is not suitable and / or incompatible if the current plans are approved. All tree removal must comply with guidelines specified in section 4 of this report and subject to regulatory approval.
- **Retain:** Trees that are to be subject to minor encroachment (low or no impact) from the proposed works therefore retention is suitable under the Australian Standards (4970-2009).
- **Potential to be retained:** The project arborist will need to confirm the viability of tree retention depending on proposed construction methods.

3. Results and discussion

Results of the arboricultural assessment are summarised in Table 4. Detailed results are included in Appendices C and D. Site photos are provided in Appendix F and the site plan is in Appendix G.

Table 4: Summary of tree retention values and proposed action

Retention value	Remove	Retain	Potential to be retained	Total
Priority for retention (High)	6	9	4	**19**
Consider for retention (Medium)	42	28	40	**110**
Consider for removal (Low)	28	15	3	**46**
Total	**76**	**52**	**47**	**175**

TREES PROPOSED TO BE REMOVED (HIGH IMPACT)

A total of **76 trees** will be highly affected (>20 % TPZ encroachment and/or SRZ encroachment) by the proposed development and cannot be retained within the current design footprint. Specific areas of impact are tabulated in Appendix D. These trees and their retention values are as follows:

- **High retention:** a total of **six high retention value trees** will be subject to high impact. Tree numbers are as follows:
  - Trees 100, 101, 110, 119, 171 and 174.
- **Medium retention:** a total of **42 medium retention** value trees will be subject to high impact. Tree numbers are as follows:
  - Trees 97 - 99 (group of 11), 106 - 108, 111 – 113, 122, 127, 130, 132, 153 – 158, 160, 168, 169, 173, 178, 225, 227, 233 and 235.
- **Low retention:** a total of **28 low retention value trees** will be subject to high impact. Tree numbers are as follows:
  - Trees 102-105, 109, 129, 131, 133 – 135, 159, 161 – 167, 170, 210, 211, 215, 219, 224, 226, 234 and 236.

Of these, a total of nine trees (Trees 102, 103, 104 and 130 – 135) are proposed to be removed due to the miscellaneous works outside the proposed High School area.

Any loss of trees should be offset with replacement planting in accordance with the relevant offset policy.

TREES PROPOSED TO BE RETAINED (LOW/NO IMPACT)

A total of **52 trees** are proposed to be retained. Of these, a total of **three trees** will be subject to low impact (<10% TPZ encroachment) and **49 trees** will be subject to no impact (0% TPZ encroachment) from the proposed development. Impact and tree retention values are as follows:

- **Low impact (<10% TPZ encroachment)**
  - **High retention value: one** high retention value (Tree 120)
  - **Medium retention value: two** medium retention values (Trees 114.4 and 220)
- **No impact (0% TPZ encroachment)**

- **High retention value: eight** high retention value trees (Tree 137-139, 141, 144, 149, 152 and 181)
- **Medium retention value: 26** medium retention value trees (Trees 90-93, 96, 114.5, 121, 123, 142, 143 (group of 8), 145 - 148, 150, 151, 230, 231 and 232).
- **Low retention value: 15** low retention value trees (Trees 124, 136, 140, 176, 177, 182, 222, 228, 229, 286, 290, 290.1 and 291)

TREES WITH POTENTIAL TO BE RETAINED

A total of **47 trees** are proposed to be retained subject to mitigation measures and consultation with the Project Arborist and may require root mapping. Of these, **45 trees** are currently subject to high impact (>20% TPZ encroachment and/or SRZ encroachment) and **two trees** are subject to medium impact (>10% and <20% TPZ encroachment) based on the proposed development footprint. It is recommended that the construction methodology for the works in these locations be developed in consultation with the Project Arborist during the detailed design phase in order to determine whether tree retention is viable. Impact and tree retention values are as follows:

- **High impact (>20% TPZ encroachment and/or SRZ encroachment)**
  - **High retention: four** (Trees 118, 172, 175 & 183)
  - **Medium retention: 38** trees
    - Trees 114.1-114.3, 114.7, 114.8, 115 – 117, 125, 126, 128, 180, 212 (group of 10), 214 (group of 10), 216 and 217 (group of 5)
  - **Low retention: three** (Trees 218, 221 and 223)
- **Medium impact (>10% and <20% TPZ encroachment)**
  - **Medium retention: 2** (Trees 114.6 and 179)

The tree protection plan is outlined in section 4 of this report and tree protection guidelines are provided in Appendix E.

4. Tree protection plan

- All tree work must be in accordance with Australian Standard *AS 4373-2007, Pruning of Amenity Trees* and the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998).
- Permission must be granted from the relevant consent authority prior to removing or pruning of any of the subject trees. Approved tree works should not be carried out before the installation of tree protection measures.
- Any additional construction activities within the TPZ of the subject trees must be assessed and approved by the project arborist and must comply with *AS 4970-2009 - Protection of trees on development sites.*

Tree protection guidelines are summarised in Table 5 and further information is in Appendix E.

Table 5: Summary of tree protection measures

Type	More details	Comment
Signage	Appendix E1	Prominently sign posted with 300 mm x 450 mm boards stating, "NO ACCESS - TREE PROTECTION ZONE".
Tree protection fencing	Appendix E1	Protective cyclone chain wire link fence to be erected around the TPZ to protect and isolate retained trees from the construction works. Existing boundary fencing may be used. There is no specified distance as long as the whole TPZ is encompassed by the fencing.
Crown protection	Appendix E2	Where required, crown protection may include the installation of a physical barrier, pruning selected branches to establish clearance, or the tying/bracing of branches.
Trunk and branch protection	Appendix E3	When fencing is not practical or prior to any activities within the TPZ, trunk protection is required and consist of a layer geotextile fabric or similar followed by 1.8 m lengths of softwood timbers spaced evenly around the trunk and secured with a galvanised hoop strap.
Ground protection	Appendix E4	Install and maintain 100mm thick layer of mulch around tree in TPZ. For machine or vehicle access within TPZ geotextile fabric beneath crushed rock or rumble boards may be required.
Soil moisture		Soil moisture levels should be regularly monitored by the project arborist. Temporary irrigation or watering may be required within TPZ.
Root protection and investigation	Appendix E5	If incursions/excavation within the TPZ are unavoidable, root investigation may be needed to determine the extent and location of roots within the area of construction activity using non-destructive excavation (NDE) methods.
Underground services	Appendix E6	All underground services should be routed outside of the TPZ. If underground services need to be installed within the TPZ, they should be installed using horizontal directional drilling (HDD), non-destructive excavation (NDE) methods such as hydro-vacuum, Air Spade or manually excavated trenches.

5. Hold points, inspection and certification

An AQF Level 5 Consulting Arborist needs to be engaged to supervise work within the TPZ, provide advice regarding tree protection and monitor compliance. Once each stage is reached, the work will be inspected and certified by the project arborist and the next stage may commence. Alterations to this schedule may be required due to necessity, however, this shall be through consultation with the project arborist only.

A copy of this report must be available on-site prior to the commencement of works, and throughout the entirety of the project. Hold points have been specified in the schedule of works below to ensure trees are adequately protected during construction. It is the responsibility of the principal contractor to complete each of the tasks.

Pre-construction

Detailed design: During the detailed design phase the Project Arborist is to be consulted to aid in determining an appropriate construction method for the trees marked as 'potential to be retained.' Mitigation measures such as root investigation may be required.

Post Approval: An initial site meeting should be completed by the appointed Project Arborist with the site manager/engineer and construction personnel (who will be setting up the tree protection measures) prior to any commencement of works to discuss the tree protection measures required for the trees approved to be retained. Trees that are approved for removal should be indicated clearly on site with spray paint on trunks. All approvals for removal and retention are to be attained by the relevant consent authority prior to construction and tree removal is to be carried out by an experienced tree surgeon with a minimum qualification of AQF Level 3.

During construction

Monthly inspection of trees by the project arborist (or other timing as agreed with the project arborist). Where there is potential conflict between tree canopy and construction activities, notification is to be given prior to the commencement of work within the TPZ, with supervision by the project arborist of any work undertaken in this zone.

Post-construction

Final inspection of trees by project arborist after all major construction has ceased and following the removal of tree protection measures.

6. References

6.1 General references

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6.2 Project specific references

Context Landscape Architecture 2021. *Cover Sheet, New High School in Bungendore*. Revision 1, dwg no. BHS_LA_SSDA_1001, job no. 15562, dated 26 July 2021

Project Surveyors 2021. *Detail Survey*. Job ref, B04901, dwg no. B04901-BUN-A, dated 3 May 2021, amended 1 April 2021

TKD Architects 2021. *Proposed Site Plan A3, New High School in Bungendore*. Sheet B1, Job no. 200096, revision A dated 1 September 2021.

Appendix A Tree retention assessment method

A1 Tree Significance Assessment Criteria - STARS©

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

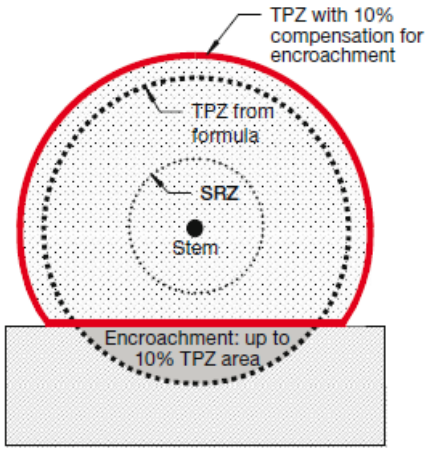
Low	Medium	High
The tree is in fair-poor condition and good or low vigour.	The tree is in fair to good condition and good or low vigour	The tree is in good condition and good vigour
The tree has form atypical of the species	The tree has form typical or atypical of the species	The tree has a form typical for the species
The tree is not visible or is partly visible from the surrounding properties or obstructed by other vegetation or buildings	The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area	The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age.
The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area	The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street	The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on Council's significant tree register
The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen	The tree provides a fair contribution to the visual character and amenity of the local area	The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity.
The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions	The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ	The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values.
The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms		The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions.
The tree has a wound or defect that has the potential to become structurally unsound.		
Environmental Pest / Noxious Weed The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties. The tree is a declared noxious weed by legislation.		
Hazardous /Irreversible Decline The tree is structurally unsound and / or unstable and is considered potentially dangerous. The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.		

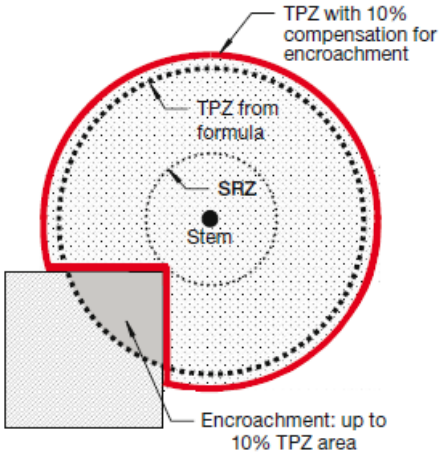
A2 Matrix assessment - STARS©

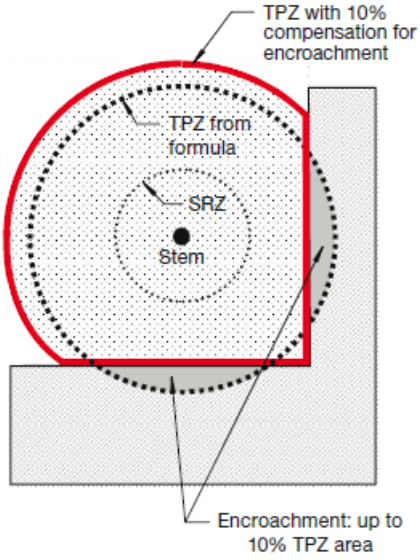
		Tree significance				
		High	Medium	Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape	Environmental Pest/Noxious Weed Species	Hazardous/ Irreversible Decline
Useful Life Expectancy	Long >40 years					
	Medium 15-40 years					
	Short <1-15 years					
	Dead					

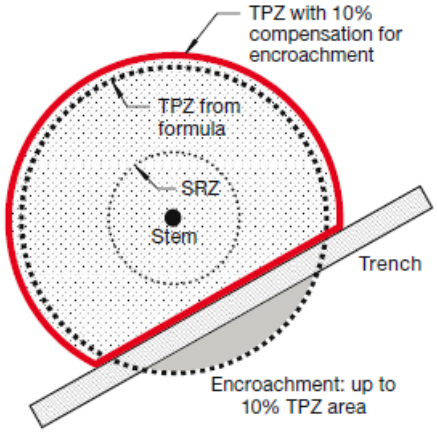
	Priority for retention (High): Tree considered important so should be retained and protected. Design modification or re-location of structure should be considered to accommodate the setbacks as prescribed by the *Australian Standard AS4970 Protection of trees on development sites*. Tree sensitive construction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

Appendix B Encroachment into tree protection zones - AS 4970-2009









Appendix C Maps

Figure 5: Tree locations map

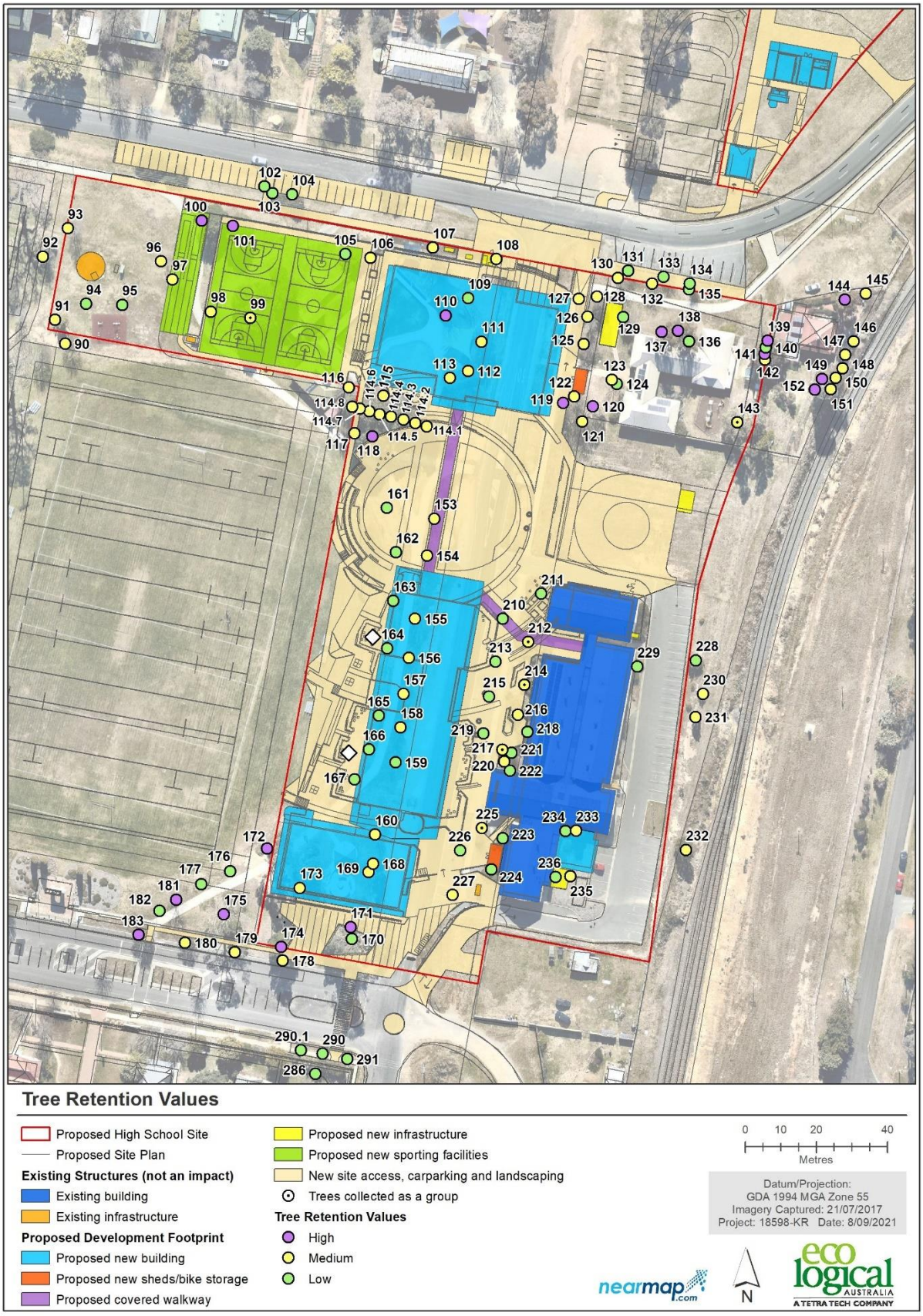


Figure 6: Tree retention values

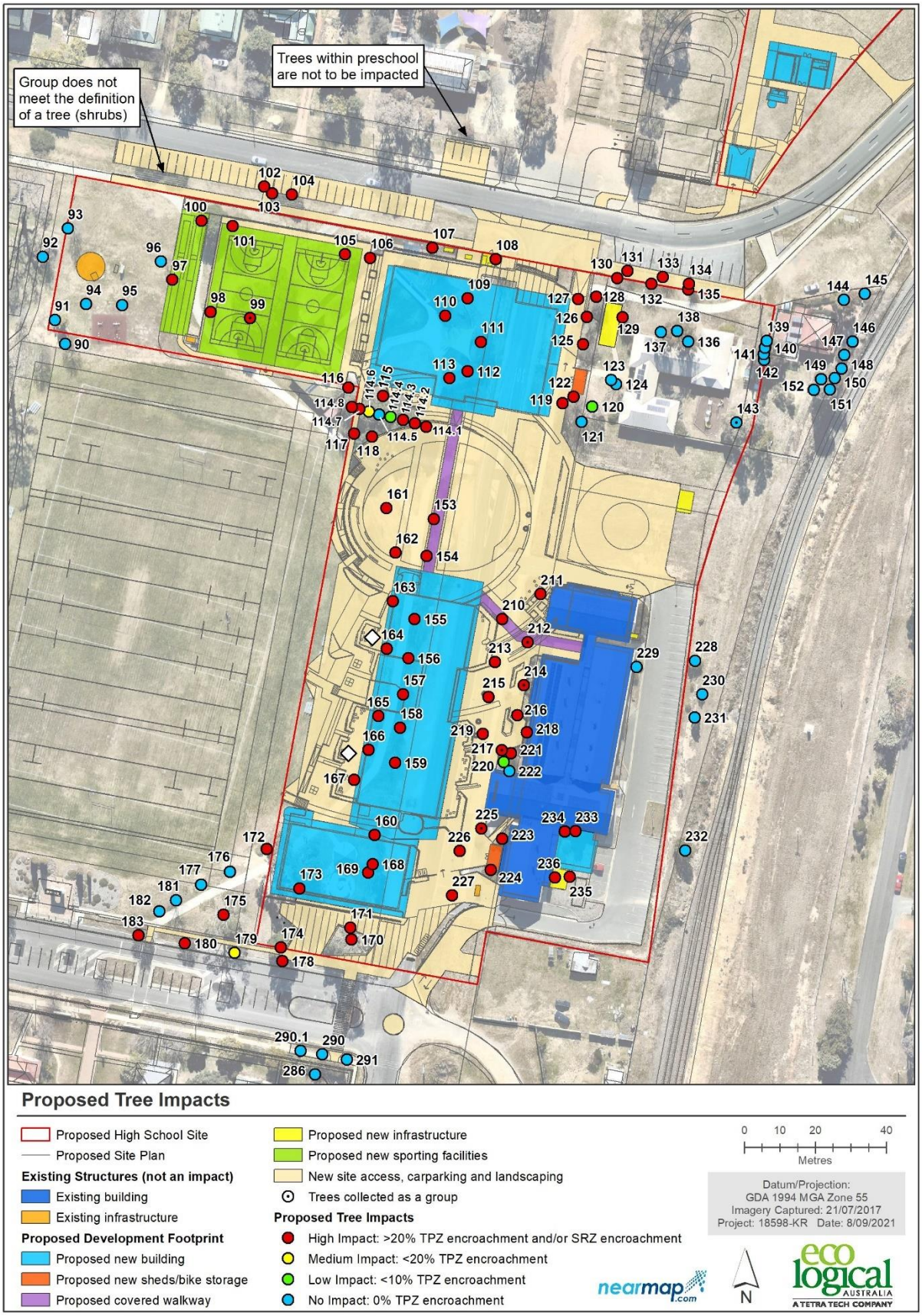


Figure 7: Arboricultural impact assessment

Figure 8: Tree canopy density

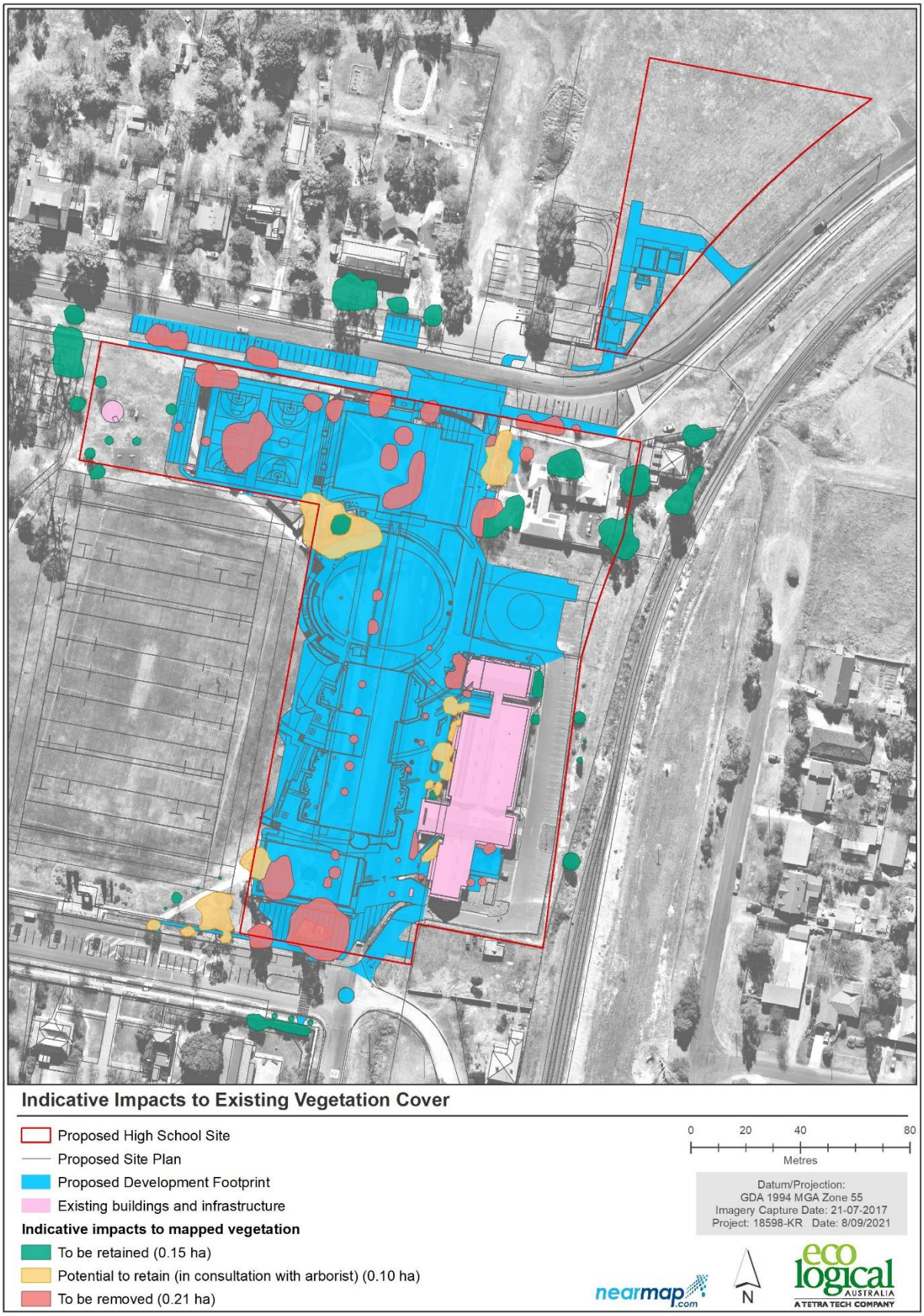


Figure 9: Indicative tree canopy impacts

Appendix D Tabulated results of arboricultural assessment

Tree	Botanical name	Trees in group	Location surveyed	Height (m)	Spread (m)	DBH (mm)	Health	Structure	Safe Useful Life Expectancy (SULE)	Landscape significance	TPZ (m)	SRZ (m)	Retention value	Impact percentage (%)	Impact	Impact Area	Proposed Action	Notes
90	*Fraxinus raywood*	1	Yes	7	7	300	Good	Good	Long (>40 years)	Medium	2	1.5	Medium	0.00	No Impact: 0% TPZ encroachment		Retain	
91	*Pinus radiata*	1	Yes	6	6	300	Fair	Good	Long (>40 years)	Medium	2	1.5	Medium	0.00	No Impact: 0% TPZ encroachment		Retain	
92	*Deciduous unknown sp.*	1	Yes	7	5	300	Good	Good	Long (>40 years)	Medium	2	1.5	Medium	0.00	No Impact: 0% TPZ encroachment		Retain	deciduous
93	*Deciduous unknown sp.*	1	Yes	9	7	300	Good	Good	Long (>40 years)	Medium	2	1.5	Medium	0.00	No Impact: 0% TPZ encroachment		Retain	
94	*Fraxinus sp.*	1	Yes	4	2	100	Good	Good	Long (>40 years)	Low	2	1.5	Low	0.00	No Impact: 0% TPZ encroachment		Retain	
95	*Fraxinus sp.*	1	Yes	5	3	100	Good	Good	Long (>40 years)	Low	2	1.5	Low	0.00	No Impact: 0% TPZ encroachment		Retain	deciduous
96	*Deciduous unknown sp.*	1	Yes	4	4	100	Good	Good	Long (>40 years)	Medium	2.0	1.5	Medium	0.00	No Impact: 0% TPZ encroachment		Retain	deciduous
97	*Deciduous unknown sp.*	1	Yes	7	5	300	Good	Good	Long (>40 years)	Medium	3.6	2.0	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New sporting facilities/courts	Remove	deciduous
98	*Deciduous unknown sp.*	1	No	8	5	200	Good	Good	Long (>40 years)	Medium	2.4	1.7	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New sporting facilities/courts	Remove	deciduous
99	*Cupressus x leylandii*	11	No	10	6	350	Fair	Fair	Long (>40 years)	Medium	4.2	2.1	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New sporting facilities/courts	Remove	group of 11 trees + multitrunked
100	*Pinus radiata*	1	Yes	9	12	500	Good	Good	Long (>40 years)	High	6.0	2.5	High	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New sporting facilities/courts	Remove	Multi trunked

Tree	Botanical name	Trees in group	Location surveyed	Height (m)	Spread (m)	DBH (mm)	Health	Structure	Safe Useful Life Expectancy (SULE)	Landscape significance	TPZ (m)	SRZ (m)	Retention value	Impact percentage (%)	Impact	Impact Area	Proposed Action	Notes
101	*Pinus radiata*	1	Yes	10	10	550	Good	Good	Long (>40 years)	High	6.6	2.6	High	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New sporting facilities/courts	Remove	
102	*Acacia sp.*	1	Yes	3	4	100	Fair	Fair	Short (5-15 years)	Medium	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking and landscaping	Remove	Multi trunked
103	*Acacia sp.*	1	Yes	3	6	100	Fair	Poor	Short (5-15 years)	Medium	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking and landscaping	Remove	Multi trunked
104	*Melaleuca lanceolata*	1	Yes	4	7	100	Fair	Fair	Short (5-15 years)	Medium	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking and landscaping	Remove	Multi trunked
105	*Acacia sp.*	1	Yes	5	7	200	Fair	Fair	Short (5-15 years)	Medium	2.4	1.7	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & new sporting facilities/courts	Remove	included bark
106	*Fraxinus raywood*	1	Yes	8	7	300	Good	Good	Long (>40 years)	Medium	3.6	2.0	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & new sporting facilities/courts	Remove	
107	*Deciduous unknown sp.*	1	Yes	8	11	650	Good	Good	Long (>40 years)	Medium	7.8	2.8	Medium	66.73	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & new infrastructure services	Remove	deciduous at time
108	*Ulmus sp.*	1	Yes	8	7	350	Good	Good	Long (>40 years)	Medium	4.2	2.1	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping, infrastructure services & school building	Remove	deciduous

Tree	Botanical name	Trees in group	Location surveyed	Height (m)	Spread (m)	DBH (mm)	Health	Structure	Safe Useful Life Expectancy (SULE)	Landscape significance	TPZ (m)	SRZ (m)	Retention value	Impact percentage (%)	Impact	Impact Area	Proposed Action	Notes
109	*Prunus sp.*	1	Yes	5	7	250	Good	Good	Long (>40 years)	Low	3.0	1.8	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New school building	Remove	deciduous at time
110	*Fraxinus raywood*	1	Yes	12	9	500	Good	Good	Long (>40 years)	High	6.0	2.5	High	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New school building	Remove	deciduous
111	*Fraxinus raywood*	1	Yes	9	9	400	Good	Good	Long (>40 years)	Medium	4.8	2.3	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New school building	Remove	deciduous
112	*Fraxinus raywood*	1	Yes	8	8	400	Good	Good	Long (>40 years)	Medium	4.8	2.3	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New school building	Remove	deciduous
113	*Fraxinus raywood*	1	Yes	8	8	400	Good	Good	Long (>40 years)	Medium	4.8	2.3	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New school building	Remove	deciduous
114.1	*Casuaurina sp.*	1	No	12	8	400	Good	Good	Medium (15-40 years)	Medium	4.8	2.3	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Potential to be retained	
114.2	*Casuaurina sp.*	1	No	12	8	400	Good	Good	Medium (15-40 years)	Medium	4.8	2.3	Medium	63.09	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Potential to be retained	
114.3	*Casuaurina sp.*	1	No	12	8	400	Good	Good	Medium (15-40 years)	Medium	4.8	2.3	Medium	26.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Potential to be retained	
114.4	*Casuaurina sp.*	1	No	12	8	400	Good	Good	Medium (15-40 years)	Medium	4.8	2.3	Medium	5.35	Low Impact: <10% TPZ encroachment	New site access, carparking & landscaping	Retain	

Tree	Botanical name	Trees in group	Location surveyed	Height (m)	Spread (m)	DBH (mm)	Health	Structure	Safe Useful Life Expectancy (SULE)	Landscape significance	TPZ (m)	SRZ (m)	Retention value	Impact percentage (%)	Impact	Impact Area	Proposed Action	Notes
114.5	*Casuaurina sp.*	1	No	12	8	400	Good	Good	Medium (15-40 years)	Medium	4.8	2.3	Medium	0.00	No Impact: 0% TPZ encroachment		Retain	
114.6	*Casuaurina sp.*	1	No	12	8	400	Good	Good	Medium (15-40 years)	Medium	4.8	2.3	Medium	17.98	Medium Impact: <20% TPZ encroachment	New site access, carparking & landscaping	Potential to be retained	
114.7	*Casuaurina sp.*	1	No	12	8	400	Good	Good	Medium (15-40 years)	Medium	4.8	2.3	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Potential to be retained	
114.8	*Casuaurina sp.*	1	No	12	8	400	Good	Good	Medium (15-40 years)	Medium	4.8	2.3	Medium	38.39	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Potential to be retained	
115	*Fraxinus raywood*	1	No	8	5	400	Good	Good	Long (>40 years)	Medium	4.8	2.3	Medium	28.37	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Potential to be retained	deciduous
116	*Deciduous unknown sp.*	1	No	9	10	500	Good	Good	Long (>40 years)	Medium	6.0	2.5	Medium	55.76	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & sporting facilities/courts	Potential to be retained	deciduous at time
117	*Fraxinus raywood*	1	No	9	7	300	Good	Good	Long (>40 years)	Medium	3.6	2.0	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Potential to be retained	deciduous at time
118	*Pinus radiata*	1	No	14	11	750	Good	Fair	Long (>40 years)	High	9.0	2.9	High	59.38	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Potential to be retained	
119	*Quercus robur*	1	Yes	10	10	550	Good	Good	Long (>40 years)	High	6.6	2.6	High	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & school building	Remove	deciduous at time
120	*Quercus robur*	1	Yes	10	10	550	Good	Good	Long (>40 years)	High	6.6	2.6	High	3.56	Low Impact: <10% TPZ encroachment	New storage shed	Retain	deciduous at time

Tree	Botanical name	Trees in group	Location surveyed	Height (m)	Spread (m)	DBH (mm)	Health	Structure	Safe Useful Life Expectancy (SULE)	Landscape significance	TPZ (m)	SRZ (m)	Retention value	Impact percentage (%)	Impact	Impact Area	Proposed Action	Notes
121	*Quercus robur*	1	Yes	8	6	280	Good	Good	Long (>40 years)	Medium	3.4	1.9	Medium	0.00	No Impact: 0% TPZ encroachment		Retain	deciduous at time
122	*Quercus robur*	1	Yes	7	10	300	Good	Good	Long (>40 years)	Medium	3.6	2.0	Medium	45.10	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & storage shed	Remove	deciduous at time
123	*Betula alba*	1	Yes	8	6	250	Good	Good	Long (>40 years)	Medium	3.0	1.8	Medium	0.00	No Impact: 0% TPZ encroachment		Retain	deciduous at time
124	*Betula alba*	1	Yes	6	5	200	Good	Good	Long (>40 years)	Low	2.4	1.7	Low	0.00	No Impact: 0% TPZ encroachment		Retain	deciduous at time
125	*Malus sp.*	1	Yes	5	6	250	Good	Good	Medium (15-40 years)	Medium	3.0	1.8	Medium	25.26	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping, school building & infrastructure services	Potential to be retained	deciduous at time
126	*Fraxinus raywood*	1	Yes	8	7	320	Good	Good	Long (>40 years)	Medium	3.8	2.1	Medium	36.68	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping, school building & infrastructure services	Potential to be retained	deciduous at time
127	*Fraxinus raywood*	1	Yes	5	6	250	Good	Good	Long (>40 years)	Medium	3.0	1.8	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping, school building & infrastructure services	Remove	deciduous at time
128	*Fraxinus raywood*	1	Yes	9	8	400	Good	Good	Long (>40 years)	Medium	4.8	2.3	Medium	24.17	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping, school building & infrastructure services	Potential to be retained	deciduous at time

Tree	Botanical name	Trees in group	Location surveyed	Height (m)	Spread (m)	DBH (mm)	Health	Structure	Safe Useful Life Expectancy (SULE)	Landscape significance	TPZ (m)	SRZ (m)	Retention value	Impact percentage (%)	Impact	Impact Area	Proposed Action	Notes
129	*Prunus sp.*	1	Yes	6	6	200	Good	Fair	Medium (15-40 years)	Low	2.4	1.7	Low	29.48	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New infrastructure services	Remove	deciduous at time + multitrunked
130	*Castanospermum australe*	1	Yes	8	9	400	Good	Good	Medium (15-40 years)	Medium	4.8	2.3	Medium	44.98	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Remove	deciduous at time
131	*Castanospermum australe*	1	Yes	4	4	200	Good	Fair	Medium (15-40 years)	Low	2.4	1.7	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Remove	deciduous at time
132	*Castanospermum australe*	1	Yes	6	7	280	Good	Fair	Medium (15-40 years)	Medium	3.4	1.9	Medium	45.54	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Remove	inclusion deciduous at time
133	*Prunus sp.*	1	Yes	4	5	150	Good	Fair	Medium (15-40 years)	Low	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Remove	deciduous at time
134	*Prunus sp.*	1	Yes	5	5	200	Good	Good	Medium (15-40 years)	Low	2.4	1.7	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Remove	deciduous at time
135	*Prunus sp.*	1	Yes	3	2	150	Poor	Poor	Short (5-15 years)	Low	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Remove	deciduous at time
136	*Fraxinus raywood*	1	Yes	3	3	100	Good	Good	Long (>40 years)	Low	2.0	1.5	Low	0.00	No Impact: 0% TPZ encroachment		Retain	deciduous at time
137	*Eucalyptus sp.*	1	Yes	15	9	600	Good	Good	Long (>40 years)	High	7.2	2.7	High	0.00	No Impact: 0% TPZ encroachment		Retain	
138	*Eucalyptus sp.*	1	Yes	14	10	600	Good	Good	Long (>40 years)	High	7.2	2.7	High	0.00	No Impact: 0% TPZ encroachment		Retain	

Tree	Botanical name	Trees in group	Location surveyed	Height (m)	Spread (m)	DBH (mm)	Health	Structure	Safe Useful Life Expectancy (SULE)	Landscape significance	TPZ (m)	SRZ (m)	Retention value	Impact percentage (%)	Impact	Impact Area	Proposed Action	Notes
139	*Eucalyptus sp.*	1	Yes	14	7	350	Good	Good	Long (>40 years)	High	4.2	2.1	High	0.00	No Impact: 0% TPZ encroachment		Retain	
140	*Eucalyptus sp.*	1	Yes	14	6	400	Poor	Poor	Short (5-15 years)	Low	4.8	2.3	Low	0.00	No Impact: 0% TPZ encroachment		Retain	
141	*Eucalyptus sp.*	1	Yes	15	13	600	Good	Good	Long (>40 years)	High	7.2	2.7	High	0.00	No Impact: 0% TPZ encroachment		Retain	
142	*Eucalyptus sp.*	1	Yes	9	5	200	Fair	Fair	Long (>40 years)	Medium	2.4	1.7	Medium	0.00	No Impact: 0% TPZ encroachment		Retain	unable to see properly
143	*Eucalyptus sp.*	8	Yes	16	9	400	Good	Good	Long (>40 years)	Medium	4.8	2.3	Medium	0.00	No Impact: 0% TPZ encroachment		Retain	group of 8 in childcare playground
144	*Eucalyptus sp.*	1	No	17	14	550	Good	Good	Long (>40 years)	High	6.6	2.6	High	0.00	No Impact: 0% TPZ encroachment		Retain	
145	*Prunus sp.*	1	No	5	7	200	Good	Good	Medium (15-40 years)	Medium	2.4	1.7	Medium	0.00	No Impact: 0% TPZ encroachment	-	Retain	Multi trunked
146	*Prunus sp.*	1	No	4	8	240	Good	Good	Medium (15-40 years)	Medium	2.9	1.8	Medium	0.00	No Impact: 0% TPZ encroachment	-	Retain	
147	*Betula alba*	1	No	5	5	250	Good	Fair	Long (>40 years)	Medium	3.0	1.8	Medium	0.00	No Impact: 0% TPZ encroachment	-	Retain	Multi trunked
148	*Betula alba*	1	No	6	6	400	Good	Fair	Long (>40 years)	Medium	4.8	2.3	Medium	0.00	No Impact: 0% TPZ encroachment	-	Retain	lopped
149	*Eucalyptus sp.*	1	No	17	15	600	Good	Good	Long (>40 years)	High	7.2	2.7	High	0.00	No Impact: 0% TPZ encroachment	-	Retain	
150	*Eucalyptus sp.*	1	No	7	4	300	Fair	Fair	Long (>40 years)	Medium	3.6	2.0	Medium	0.00	No Impact: 0% TPZ encroachment	-	Retain	Leaning
151	*Eucalyptus sp.*	1	No	5	5	300	Fair	Fair	Long (>40 years)	Medium	3.6	2.0	Medium	0.00	No Impact: 0% TPZ encroachment	-	Retain	
152	*Eucalyptus sp.*	1	No	18	10	400	Good	Good	Long (>40 years)	High	4.8	2.3	High	0.00	No Impact: 0% TPZ encroachment	-	Retain	
153	*Platanus orientalis*	1	No	6	6	300	Good	Good	Long (>40 years)	Medium	3.6	2.0	Medium	100.00	High Impact: >20% TPZ	New site access,	Remove	

Tree	Botanical name	Trees in group	Location surveyed	Height (m)	Spread (m)	DBH (mm)	Health	Structure	Safe Useful Life Expectancy (SULE)	Landscape significance	TPZ (m)	SRZ (m)	Retention value	Impact percentage (%)	Impact	Impact Area	Proposed Action	Notes
															encroachment and/or SRZ encroachment	carparking, landscaping & undercover walkway		
154	*Platanus orientalis*	1	No	8	6	300	Good	Good	Long (>40 years)	Medium	3.6	2.0	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping, undercover walkway & school building	Remove	
155	*Platanus orientalis*	1	No	7	5	300	Good	Good	Long (>40 years)	Medium	3.6	2.0	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New school building	Remove	
156	*Platanus orientalis*	1	No	7	5	300	Good	Good	Long (>40 years)	Medium	3.6	2.0	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New school building	Remove	
157	*Platanus orientalis*	1	No	7	5	300	Good	Good	Long (>40 years)	Medium	3.6	2.0	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New school building	Remove	
158	*Platanus orientalis*	1	No	8	6	300	Good	Good	Long (>40 years)	Medium	3.6	2.0	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New school building	Remove	
159	*Platanus orientalis*	1	No	5	3	250	Fair	Fair	Long (>40 years)	Low	3.0	1.8	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New school building	Remove	
160	*Platanus orientalis*	1	Yes	7	6	300	Good	Good	Long (>40 years)	Medium	3.6	2.0	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New school building	Remove	
161	*Ulmus sp.*	1	No	3	1	100	Good	Good	Long (>40 years)	Medium	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping,	Remove	

Tree	Botanical name	Trees in group	Location surveyed	Height (m)	Spread (m)	DBH (mm)	Health	Structure	Safe Useful Life Expectancy (SULE)	Landscape significance	TPZ (m)	SRZ (m)	Retention value	Impact percentage (%)	Impact	Impact Area	Proposed Action	Notes
162	*Ulmus sp.*	1	No	3	1	100	Good	Good	Long (>40 years)	Medium	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping, undercover walkway & school building	Remove	deciduous at time
163	*Ulmus sp.*	1	No	3	1	100	Good	Good	Long (>40 years)	Medium	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & school building	Remove	deciduous at time
164	*Ulmus sp.*	1	No	1	1	100	Poor	Poor	Remove (<5 years)	Low	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & school building	Remove	
165	*Ulmus sp.*	1	No	2	1	100	Good	Good	Long (>40 years)	Low	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & school building	Remove	deciduous at time
166	*Ulmus sp.*	1	No	3	1	100	Good	Good	Long (>40 years)	Low	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & school building	Remove	deciduous at time
167	*Ulmus sp.*	1	No	3	1	100	Good	Good	Long (>40 years)	Medium	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & school building	Remove	deciduous at time
168	*Eucalyptus sp.*	1	Yes	13	6	400	Fair	Fair	Medium (15-40 years)	Medium	4.8	2.3	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & school building	Remove	inclusion
169	*Deciduous unknown sp.*	1	No	7	6	300	Good	Good	Long (>40 years)	Medium	3.6	2.0	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & school building	Remove	deciduous
170	*Pinus radiata*	1	Yes	20	22	1750	Fair	Fair	Short (5-15 years)	Medium	15.0	4.2	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Remove	dieback

Tree	Botanical name	Trees in group	Location surveyed	Height (m)	Spread (m)	DBH (mm)	Health	Structure	Safe Useful Life Expectancy (SULE)	Landscape significance	TPZ (m)	SRZ (m)	Retention value	Impact percentage (%)	Impact	Impact Area	Proposed Action	Notes
171	*Eucalyptus sp.*	1	No	18	16	1000	Good	Good	Long (>40 years)	High	12.0	3.3	High	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & school building	Remove	
172	*Eucalyptus sp.*	1	No	18	12	900	Good	Good	Long (>40 years)	High	10.8	3.2	High	31.76	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & school building	Potential to be retained	
173	*Eucalyptus sp.*	1	Yes	12	10	400	Good	Good	Long (>40 years)	Medium	4.8	2.3	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & school building	Remove	
174	*Pinus radiata*	1	Yes	15	11	850	Good	Good	Long (>40 years)	High	10.2	3.1	High	67.74	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Remove	
175	*Pinus radiata*	1	No	21	18	1300	Fair	Fair	Long (>40 years)	High	15.0	3.7	High	21.86	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Potential to be retained	
176	*Ulmus sp.*	1	No	3	1	100	Good	Good	Long (>40 years)	Medium	2.0	1.5	Low	0.00	No Impact: 0% TPZ encroachment	-	Retain	deciduous at time
177	*Ulmus sp.*	1	No	4	1	100	Good	Good	Long (>40 years)	Medium	2.0	1.5	Low	0.00	No Impact: 0% TPZ encroachment		Retain	
178	*Fraxinus raywood*	1	Yes	5	5	200	Good	Good	Long (>40 years)	Medium	2.4	1.7	Medium	22.15	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Remove	deciduous at time
179	*fraxinus sp.*	1	Yes	5	6	250	Good	Good	Long (>40 years)	Medium	3.0	1.8	Medium	13.14	Medium Impact: <20% TPZ encroachment	New site access, carparking & landscaping	Potential to be retained	deciduous at time
180	*fraxinus sp.*	1	Yes	7	7	300	Good	Good	Long (>40 years)	Medium	3.6	2.0	Medium	19.28	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Potential to be retained	deciduous at time + multitrunked

Tree	Botanical name	Trees in group	Location surveyed	Height (m)	Spread (m)	DBH (mm)	Health	Structure	Safe Useful Life Expectancy (SULE)	Landscape significance	TPZ (m)	SRZ (m)	Retention value	Impact percentage (%)	Impact	Impact Area	Proposed Action	Notes
181	*Deciduous unknown sp.*	1	No	9	10	400	Good	Good	Long (>40 years)	High	4.8	2.3	High	0.00	No Impact: 0% TPZ encroachment	-	Retain	
182	*Ulmus sp.*	1	No	3	1	100	Good	Good	Long (>40 years)	Medium	2.0	1.5	Low	0.00	No Impact: 0% TPZ encroachment	-	Retain	
183	*Fraxinus raywood*	1	Yes	11	10	400	Good	Good	Long (>40 years)	High	4.8	2.3	High	12.77	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Potential to be retained	deciduous at time
210	*Deciduous unknown sp.*	1	Yes	4	4	150	Good	Good	Long (>40 years)	Medium	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & undercover walkway	Remove	
211	*Deciduous unknown sp.*	1	No	7	3	150	Good	Good	Long (>40 years)	Medium	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Remove	deciduous
212	*Group of 10 mix native spp.*	10	No	5	4	200	Fair	Fair	Short (5-15 years)	Medium	2.4	1.7	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & undercover walkway	Potential to be retained	
213	*Deciduous unknown sp.*	1	Yes	4	5	150	Good	Fair	Long (>40 years)	Medium	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Remove	deciduous at time
214	*Group of 10 native spp.*	10	No	5	3	150	Fair	Fair	Short (5-15 years)	Medium	2.0	1.5	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Potential to be retained	
215	*unknown sp.*	1	Yes	3	3	100	Good	Good	Long (>40 years)	Medium	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Remove	
216	*unknown sp.*	1	No	7	4	150	Good	Fair	Long (>40 years)	Medium	2.0	1.5	Medium	100.00	High Impact: >20% TPZ encroachment	New site access,	Potential to be retained	deciduous

Tree	Botanical name	Trees in group	Location surveyed	Height (m)	Spread (m)	DBH (mm)	Health	Structure	Safe Useful Life Expectancy (SULE)	Landscape significance	TPZ (m)	SRZ (m)	Retention value	Impact percentage (%)	Impact	Impact Area	Proposed Action	Notes
															and/or SRZ encroachment	carparking & landscaping		
217	*Group of 5 acacia sp.*	5	No	5	4	150	Fair	Fair	Short (5-15 years)	Medium	2.0	1.5	Medium	60.94	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Potential to be retained	
218	*Deciduous unknown sp.*	1	Yes	5	4	150	Good	Good	Long (>40 years)	Medium	2.0	1.5	Low	22.78	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Potential to be retained	
219	*Deciduous unknown sp.*	1	Yes	3	4	100	Good	Good	Long (>40 years)	Medium	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Remove	
220	*Deciduous unknown sp.*	1	Yes	6	5	200	Good	Good	Long (>40 years)	Medium	2.4	1.7	Medium	6.37	Low Impact: <10% TPZ encroachment	New site access, carparking & landscaping	Retain	
221	*Deciduous unknown sp.*	1	Yes	5	4	150	Good	Good	Long (>40 years)	Medium	2.0	1.5	Low	8.53	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Potential to be retained	
222	*Deciduous unknown sp.*	1	Yes	3	3	100	Good	Good	Long (>40 years)	Medium	2.0	1.5	Low	0.00	No Impact: 0% TPZ encroachment	-	Retain	
223	*Deciduous unknown sp.*	1	Yes	4	3	150	Good	Fair	Long (>40 years)	Medium	2.0	1.5	Low	11.10	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & shed	Potential to be retained	
224	*Deciduous unknown sp.*	1	No	3	6	100	Fair	Fair	Long (>40 years)	Medium	2.0	1.5	Low	38.84	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking, landscaping & shed	Remove	
225	*Deciduous unknown sp.*	5	No	6	5	200	Good	Good	Long (>40 years)	Medium	2.4	1.7	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Remove	group of 5
226	*Deciduous unknown sp.*	1	Yes	5	5	150	Good	Fair	Long (>40 years)	Medium	2.0	1.5	Low	100.00	High Impact: >20% TPZ	New site access,	Remove	

Tree	Botanical name	Trees in group	Location surveyed	Height (m)	Spread (m)	DBH (mm)	Health	Structure	Safe Useful Life Expectancy (SULE)	Landscape significance	TPZ (m)	SRZ (m)	Retention value	Impact percentage (%)	Impact	Impact Area	Proposed Action	Notes
															encroachment and/or SRZ encroachment	carparking & landscaping		
227	*Deciduous unknown sp.*	1	Yes	7	9	200	Good	Good	Long (>40 years)	Medium	2.4	1.7	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New site access, carparking & landscaping	Remove	
228	*Acacia sp.*	1	Yes	4	5	150	Poor	Poor	Remove (<5 years)	Low	2.0	1.5	Low	0.00	No Impact: 0% TPZ encroachment		Retain	Multi trunked
229	*Deciduous unknown sp.*	1	Yes	4	2	100	Good	Good	Long (>40 years)	Medium	2.0	1.5	Low	0.00	No Impact: 0% TPZ encroachment		Retain	
230	*Eucalyptus sp.*	1	No	3	2	100	Good	Fair	Long (>40 years)	Medium	2.0	1.5	Medium	0.00	No Impact: 0% TPZ encroachment		Retain	Multi trunked
231	*Eucalyptus sp.*	1	Yes	6	4	200	Good	Fair	Long (>40 years)	Medium	2.4	1.7	Medium	0.00	No Impact: 0% TPZ encroachment		Retain	Multi trunked
232	*Pinus radiata*	1	No	7	7	350	Fair	Fair	Long (>40 years)	Medium	4.2	2.1	Medium	0.00	No Impact: 0% TPZ encroachment		Retain	
233	*Deciduous unknown sp.*	1	Yes	4	4	200	Good	Good	Long (>40 years)	Medium	2.4	1.7	Medium	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New school building	Remove	
234	*Acacia sp.*	1	No	6	4	200	Poor	Poor	Remove (<5 years)	Low	2.4	1.7	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New school building	Remove	
235	*Deciduous unknown sp.*	1	No	6	6	280	Good	Good	Long (>40 years)	Medium	3.4	1.9	Medium	51.02	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New school building & infrastructure services	Remove	
236	*Deciduous unknown sp.*	1	No	4	3	100	Good	Good	Long (>40 years)	Medium	2.0	1.5	Low	100.00	High Impact: >20% TPZ encroachment and/or SRZ encroachment	New school building & infrastructure services	Remove	
286	*Acacia sp.*	1	Yes	4	5	100	Poor	Poor	Remove (<5 years)	Low	2.0	1.5	Low	0.00	No Impact: 0% TPZ encroachment		Retain	Multi trunked

Tree	Botanical name	Trees in group	Location surveyed	Height (m)	Spread (m)	DBH (mm)	Health	Structure	Safe Useful Life Expectancy (SULE)	Landscape significance	TPZ (m)	SRZ (m)	Retention value	Impact percentage (%)	Impact	Impact Area	Proposed Action	Notes
290	*Malus sp.*	1	Yes	2	2	100	Good	Fair	Long (>40 years)	Low	2.0	1.5	Low	0.00	No Impact: 0% TPZ encroachment		Retain	Street tree
290.1	*Malus sp.*	1	Yes	2	1	100	Good	Good	Long (>40 years)	Low	2.0	1.5	Low	0.00	No Impact: 0% TPZ encroachment		Retain	Street tree
291	*Malus sp.*	1	Yes	2	2	100	Good	Good	Long (>40 years)	Low	2.0	1.5	Low	0.00	No Impact: 0% TPZ encroachment		Retain	Street tree

Appendix E Tree protection guidelines

The following tree protection guidelines must be implemented during the construction period if no tree-specific recommendations are detailed.

E1 Tree protection fencing

The TPZ is a restricted area delineated by protective fencing or the use of an existing structure (such as a wall or fence).

Trees that are to be retained must have protective fencing erected around the TPZ (or as specified in the body of the report) to protect and isolate it from the construction works. Fencing must comply with the Australian Standard, AS 4687-2007, Temporary fencing and hoardings.

Tree protection fencing must be installed prior to site establishment and remain intact until completion of works. Once erected, protective fencing must not be removed or altered without the approval of the project arborist.

If the protective fencing requires temporary removal, trunk, branch and ground protection must be installed and must comply with *AS 4970-2009, Protection of Trees on Development Sites*.

Tree protection fencing shall be:

- Enclosed to the full extent of the TPZ (or as specified in the Recommendations and Tree Protection Plan).
- Cyclone chain wire link fence or similar, with lockable access gates.
- Certified and Inspected by the Project Arborist.
- Installed prior to any machinery or material are brought to site and before the commencement of works.
- Prominently sign posted with 300 mm x 450 mm boards stating, “NO ACCESS - TREE PROTECTION ZONE”.

E2 Crown protection

Tree crowns/canopy may be injured or damaged by machinery such as; excavators, drilling rigs, trucks, cranes, plant and vehicles. Where crown protection is required, it will usually be located at least one meter outside the perimeter of the crown.

Crown protection may include the installation of a physical barrier, pruning selected branches to establish clearance, or the tying/bracing of branches.

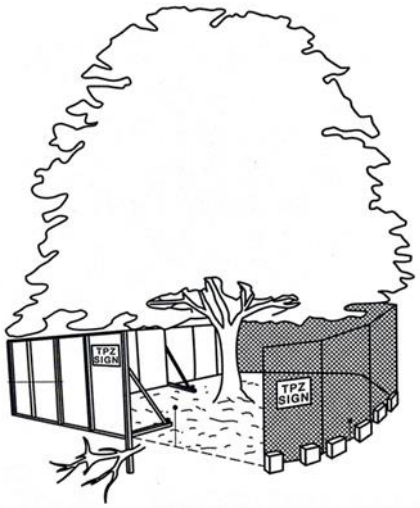
E3 Trunk protection

Where provision of tree protection fencing is impractical or must be temporarily removed, trunk protection shall be installed for the nominated trees to avoid accidental mechanical damage.

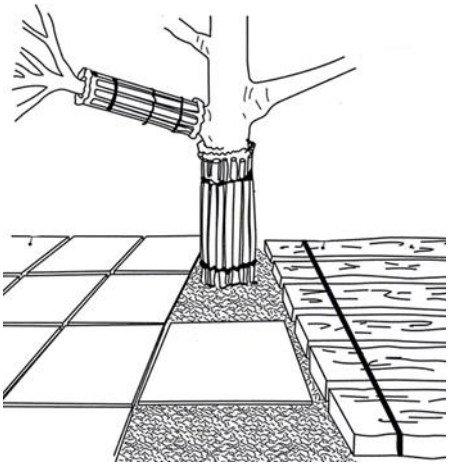
The removal of bark or branches allows the potential ingress of micro-organisms which may cause decay. Furthermore, the removal of bark restricts the trees' ability to distribute water, mineral ions (solutes), and glucose.

Trunk protection shall consist of a layer of either carpet underfelt, geotextile fabric or similar wrapped around the trunk, followed by 1.8 m lengths of softwood timbers aligned vertically and spaced evenly around the trunk (with an approx. 50 mm gap between the timbers).

The timbers must be secured using galvanised hoop strap (aluminium strapping). The timbers shall be wrapped around the trunk but not fixed to the tree, as this will cause injury/damage to the tree.



Tree protection fencing



Trunk protection fencing

E4 Ground protection

Tree roots are essential for the uptake/absorption of water, oxygen and mineral ions (solutes). It is essential to prevent the disturbance of the soil beneath the dripline and within the TPZ of trees that are to be retained. Soil compaction within the TPZ will adversely affect the ability of roots to function correctly.

If temporary access for machinery is required within the TPZ ground protection measures will be required. The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Maintain a thick layer of mulch around all retained trees to a depth of 100 mm using coarse pine bark or wood chip material that complies with AS 4454. Where the existing landscape within the TPZ is to remain unaltered (e.g. garden beds or turf) mulch may not be required.

For heavy vehicle access within TPZ, ground protection may include a permeable membrane such as geotextile fabric beneath a layer of crushed rock or rumble boards.

If the grade is to be raised within the TPZ, the material should be coarser or more porous than the underlying material.

E5 Root protection and investigation

If incursions/excavation within the TPZ are unavoidable, root investigation may be needed to determine the extent and location of roots within the area of construction activity. The location and distribution of roots are found through non-destructive excavation (NDE) methods such as hydro-vacuum excavation (sucker truck), air spade and manual excavation. Root investigation does not guarantee the retention of the tree.

If the project arborist identifies conflicting roots that requiring pruning, they must be pruned with a sharp implement such as; secateurs, pruners, handsaws or a chainsaw back to undamaged tissue. The final cut must be a clean cut.

E6 Underground services

All underground services should be routed outside of the TPZ. If underground services need to be installed within the TPZ, they should be installed using horizontal directional drilling (HDD), non-destructive excavation (NDE) methods such as hydro-vacuum, Air Spade or manually excavated trenches. The horizontal drilling/boring must be at minimum depth of 600 mm below grade. Trenching for services is to be regarded as “excavation”. The project arborist should assess the likely impacts of boring and bore pits on retained trees.

Appendix F Site photos

Figure 10: Medium retention value tree, Tree 107

Figure 11: Medium retention value trees 114.1, 114.2, 114.3, 114.4, 114.5, 114.6, 114.7 and 114.8

Figure 12: Low retention value tree, Tree 140

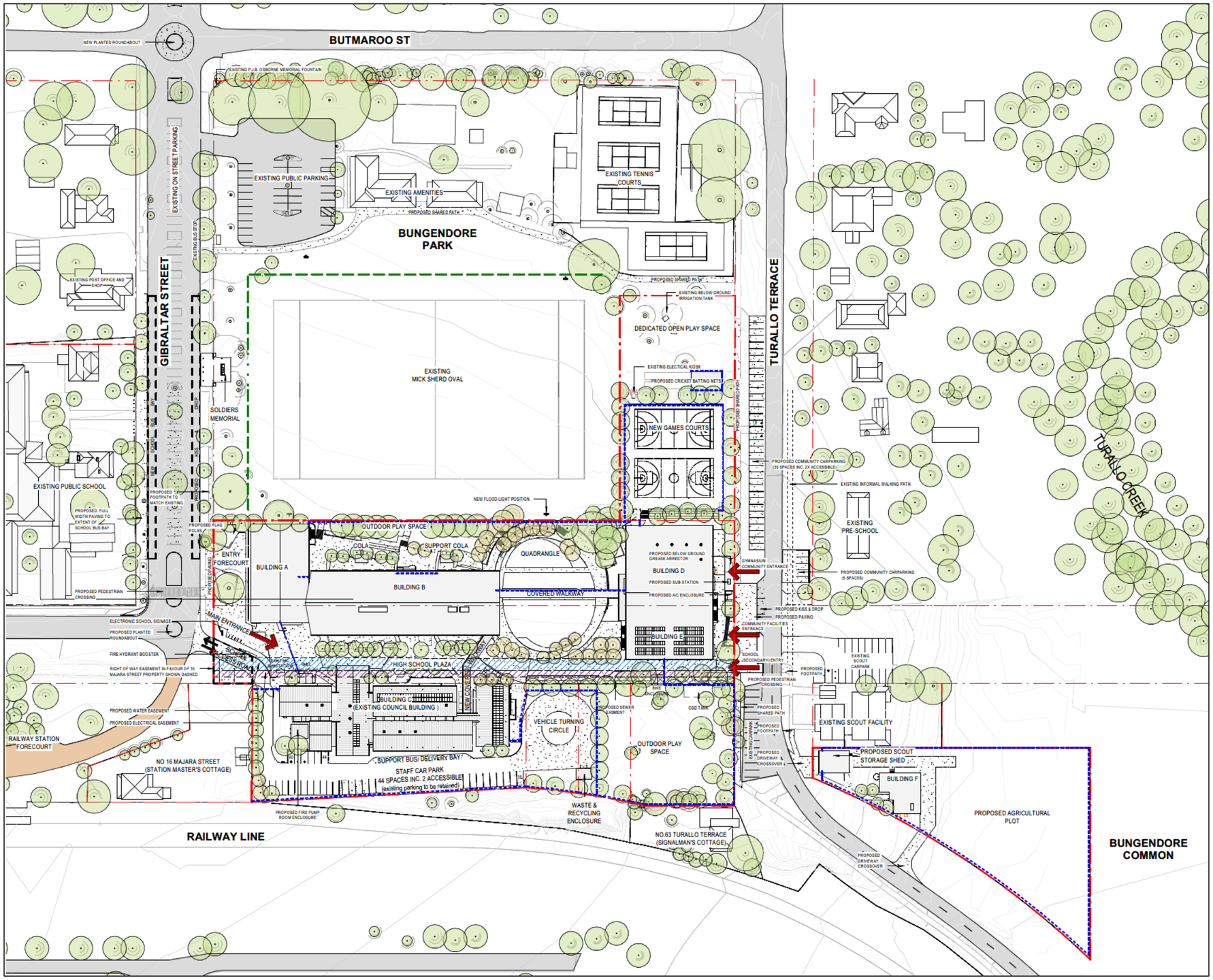
Figure 13: Medium retention value tree, Tree 153

Figure 14: Medium retention value tree, 154

Figure 15: Group of 10 medium retention value mix native spp. (Tree 212)

Figure 16: Medium retention value tree, Tree 227

Appendix G Site plan (TKD Architects 2021)



Appendix H Landscaping Site Plan (Context Landscape Architecture 2021)

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