



Arboricultural Impact Assessment

Proposed Sikh Grammar School

151-161 Tallawong Road

Date: November 2020

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2 Introduction

2.1 Background

This Arboricultural Impact Assessment (AIA) was prepared for Sym Studio in relation to the existing trees and proposed new Sikh Grammar School at 151-161 Tallawong Road, Rouse Hill.

The purpose of this AIA is to assess the likely impacts of the proposed works on the existing site trees and to make recommendations regarding tree retention or removal.

This AIA has been guided by the principles set out in the Australian Standard 4970-2009, *Protection of trees on development sites*.

2.2 Subject Site/Proposed Works

The subject site is a rural lot, currently occupied by a single dwelling, dam and open grassland. The proposed works include construction several multi-storey school buildings, play areas and car parking areas.

2.3 Subject Trees

Six (6) trees located within the site have been assessed. In accordance with the project brief, trees located outside of the property boundaries were not included in the assessment. Refer to Figure A (following page) for tree locations. The assessed trees are made up of the following species:

- Rough-barked Apple, *Angophora floribunda* (Tree 1)
- Narrow-leaved Ironbark, *Eucalyptus crebra* (Trees 2, 3, 6)
- Forest Red Gum, *Eucalyptus teriticornis* (Trees 4, 5)

Each of the assessed trees is a locally native species that is likely to have grown from remnant open forest seed stock.

None of the trees were assessed as having major significance including heritage significance and no tree is listed on a register of significant trees.

None of the assessed trees are protected under the Threatened Species Conservation Act (1995) or Biodiversity Conservation Act (1999).

Tree 6 was not plotted on the survey or Concept Plans. The approximate positions of this tree is shown in Figure A (following page).

A detailed description of the subject trees is included in the Tree Assessment Table (Section 4 –page 6).

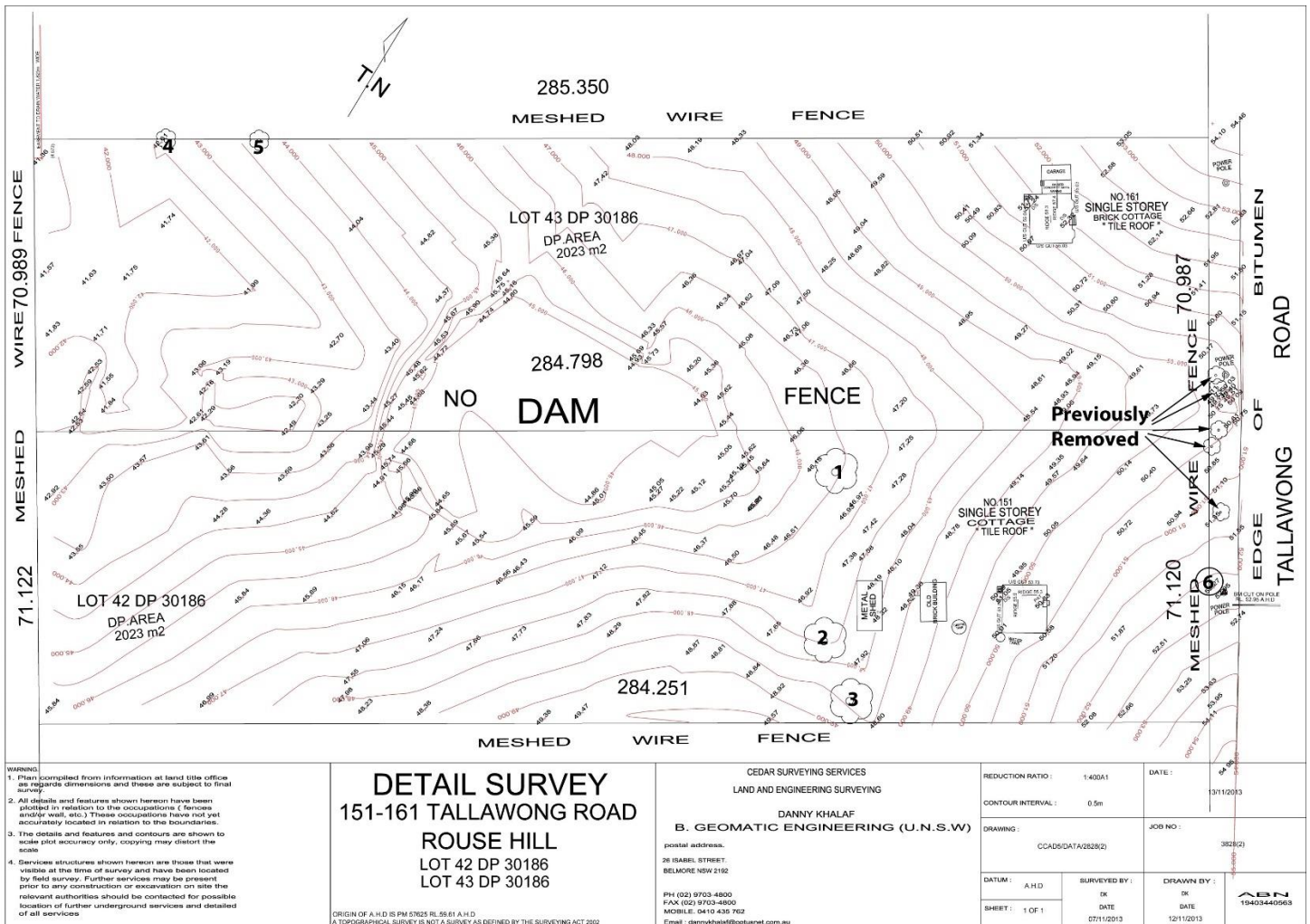


Figure A: Marked up Detail Survey showing tree locations and numbering.

3 Methodology

3.1 Site Inspection/Tree Assessment

Site inspection and tree assessment was undertaken by Alexis Anderson on the 10th of January, 2020. The trees were assessed from ground level using a Tree Assessment Table, as outlined in Section 4. The definitions and explanations of terms used are outlined in the Tree Table Definitions page which is included at Attachment A.

3.2 Plan Review

This report is based upon a review of the PMD DA-106 E, Sym Studio Concept. The plans shown within this report have been derived from the Concept Grading Plan (Sheet 13). The approximate position of Tree 6 is shown on the plans within this report.

No underground services plans, hydraulics plans, landscaping plans or engineering detail were available for review at the time of this assessment.

3.3 Tree Protection Zones

Tree assessments in accordance with the Australian Standard 4970-2009, *Protection of trees on development sites*, require calculation of a Tree Protection Zone (TPZ) and Structural Root Zone (SRZ). The following is a brief explanation of these terms:

Tree Protection Zone -TPZ: This is the area that should be isolated from construction disturbance so that the tree remains viable. Some disturbance within the TPZ may be possible following arboricultural assessment.

Structural Root Zone -SRZ: This is the area of undisturbed soil and roots required to maintain tree stability. Excavation within the SRZ can lead to whole tree failure.

3.4 Retention Values

Retention values are derived from a combination of Estimated Life Expectancy rating and Landscape and Environmental Significance ratings.

- **HIGH Retention Value:** These trees are worthy of retention and design consideration should be made where possible to allow their retention. Removal of these trees will have an impact on the landscape amenity or local environment.
- **MEDIUM Retention Value:** These trees are worthy of retention and minor design consideration should be made to retain these trees wherever possible (e.g. placement of ancillary structures, garden retaining walls, driveway levels). Removal of these trees will not have a significant impact on the landscape amenity or local environment.
- **LOW Retention Value:** These trees should not be considered to be a constraint to design layout. Some of these trees should be removed irrespective of any proposed development.

The method of determining and defining retention values used in this report has been derived from the ©Retention Index developed by Tree Wise Men® Australia Pty Ltd.

3.5 Consideration for Tree Retention and Removal

Tree removal recommendations have been based on tree Retention Values and construction offsets. Trees may generally be recommended for removal in the following circumstances:

- Trees located within construction footprints.
- Trees with construction proposed within SRZ where root loss cannot be avoided through sensitive design.
- Trees with a TPZ loss of more than 25%, may be recommended for removal providing tree sensitive design cannot be implemented to avoid significant root and canopy loss.
- Trees with low Retention Values may be recommended for removal irrespective of proposed development.

4 Tree Assessment Details

4.1 Tree Assessment Table

	Species	Trunk Diameter @ 1.4m	Height	Canopy Spread Radius	Age Class	Health/ Vitality	Structural Condition	Estimated Life Expectancy	Landscape and Environmental Significance	Retention Value
1	Rough-barked Apple, <i>Angophora floribunda</i>	1030mm	23m	9m	Late-Mature	Fair	Poor	Remove (0-10 yrs)	2	Low
		Comments: Trunk hollowing and termite damage extending from the base to 6m height. There is a large cavity from a previous stem failure at 6m height. The trunk hollow is likely to be utilized as wildlife habitat.								
2	Narrow-leaved Ironbark, <i>Eucalyptus crebra</i>	700mm	20m	8m	Mature	Poor	Poor	Remove (0-10 yrs)	2	Low
		Comments: Thinning of the upper canopy. Recent large branch failure. Trunk decay and hollowing between the base and 7m height.								
3	Narrow-leaved Ironbark, <i>Eucalyptus crebra</i>	700mm	20m	9m	Mature	Poor	Poor	Remove (0-10 yrs)	2	Low
		Comments: Previous failure of co-dominant stem from the base. The stem failure has caused a major wound extending from the base to 7m height.								
4	Forest Red Gum, <i>Eucalyptus teriticornis</i>	720mm	26m	7m	Mature	Fair	Good	Long (30+ yrs)	2	High
		Comments: The fence line runs through the centre of trunk.								
5	Forest Red Gum, <i>Eucalyptus teriticornis</i>	780mm	26m	7m	Mature	Fair	Good	Long (30+ yrs)	2	High
		Comments: -								
6	Narrow-leaved Ironbark, <i>Eucalyptus crebra</i>	200mm, 190mm, 150mm	10m	3m	Early-Mature	Good	Good	Long (30+ yrs)	3	Medium
		Comments: Growing across the boundary line.								



Photo A: Trees 1, 2 and 3 taken facing west from Tallawong Road.

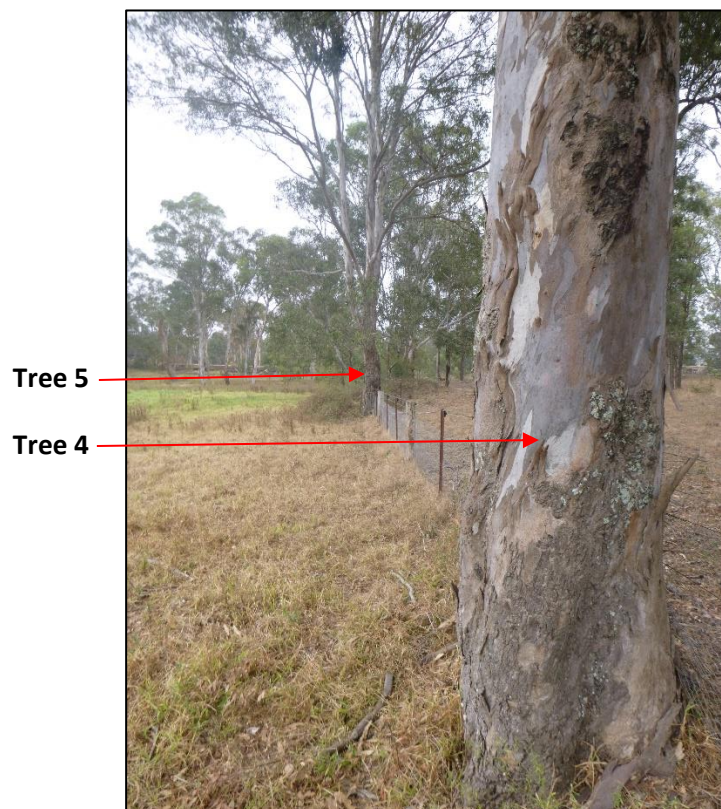


Photo B: Tree 4 and 5 taken facing west.



Photo C: Tree 6 taken facing south



Photo D: Trunk of Tree 4. Decay and hollowing spreading from the base to 6m height.



Photo E: Tree 2. Trunk decay between the base and 7m height.



Photo F: Tree 3. Major stem failure wound extending from 7m height to the base.

4.2 Tree Protection Zones

Tree Protection Offsets based on <i>AS4970-2009-Protection of Trees on Development Sites</i>		
Tree Number	Tree Protection Zone radius	Structural Root Zone radius
1	12.4m	3.4m
2	8.4m	2.9m
3	8.4m	2.9m
4	8.6m	3.0m
5	9.4m	3.0m
6	4.0m	2.1m



Figure B: Excerpt from the Concept Grading Plan showing the locations of assessed trees in relation to the proposed works.

5 Potential Impacts of Proposed Works

5.1 Trees Proposed for Removal

Tree Number	Retention Value	Reason for Removal
1, 2, 3	Low	Poor structural condition. Trunk or large limb failure is possible. Located within an area of proposed bulk earthworks/building footprint.
4, 5	High	Bulk earthworks resulting in soil fill around these trees is proposed. They are unlikely to remain viable.
6	Medium	Within the proposed area of grading for the pedestrian accessway.

5.2 Potential Impacts of Proposed Works on Retained Trees

None of the assessed trees are likely to remain viable within the context of the proposed works.

6 Recommendations

6.1 Site Establishment –Prior to Construction

Tree Removal: The tree removal contractors must be made aware of the high likelihood of encountering wildlife in Trees 1 and 2. The tree removal method must take into consideration the need to avoid harm to animals living within the hollowed trunks of these trees. A wildlife carer must be on-site to co-ordinate with contractors during tree removal works.

Tree removal works should be undertaken in accordance with the WorkSafe Australia *Guide to Managing Risks of Tree Trimming & Removal Work*.

6.2 Post Construction

Tree Planting Above & Next To Basement

New tree planting is proposed above and next to the basement as outlined in the Planting Plan -PMD DA-106 E (Sym Studio, Concept Package). The reviewed plans are conceptual only, and details regarding soil volumes and drainage are not available.

It will be possible for the proposed planting above and adjacent to the basement to succeed in the long term if the following guidelines are met with the more detailed structural and landscape design for the site:

-As a guide, the following formula based on the NATSPEC Specification for Landscape Trees should be used to calculate the soil volume required for the new trees:

$$\text{Required soil volume (m}^3\text{)} = \frac{\text{Mature Tree Height(m)} \times \text{Mature Trunk Diameter (mm)}}{100}$$

Based on this, for each of the tree species proposed above and adjacent to the basement, the following soil volumes would be required to reach an average mature size.

- *Podocarpus elatus* -30 cubic metres
- *Corymbia maculata* -100 cubic metres
- *Eucalyptus crebra* -125 cubic metres
- *Eucalyptus teriticornis* -125 cubic metres
- *Casuarina glauca* -25 cubic metres
- *Acer buergerianum* –12 cubic metres
- *Waterhousia floribunda* -20 cubic metres

-The soil used for planting must be specified by a soil scientist based on the site conditions and guided by the Soils for Landscape Development: Selection, Specification and Validation (Elke Haege and Simon Leake, CSIRO Publishing).

-A minimum soil depth of 1.0m should be provided.

-The base of the planting areas must be formed with sufficient gradient to allow drainage to a specified collection point.

-Structural soil cells such as ‘Terravault’ or ‘Stratavault’ should be incorporated into the planting soil and anchored to the base of the planting areas to provide additional root and soil stability as a measure to prevent future tree failure from windthrow.

- Permanent irrigation infrastructure should be incorporated into the detailed landscape design. The irrigation volumes should be adjustable and determined by the landscape maintenance contractor for the site.

Replacement Tree Planting: Given the proposed removal of locally native tree species it is recommended that replacement tree planting be undertaken. The following tree species have been incorporated into the proposed planting schedule:

- Rough Barked Apple, *Angophora floribunda*
- Forest Red Gum, *Eucalyptus teriticornis*
- Narrow-leaved Ironbark, *Eucalyptus crebra*
- Grey Box, *Eucalyptus moluccana*

7 Statement of Impartiality

- This report prepared by Bluegum Tree Care & Consultancy (BTCC) reflects the impartial and expert opinion of Alexis Anderson.
- BTCC is acting independently of and not as the advocate for the owners of the subject trees.
- BTCC does not undertake tree pruning and removal works and will not have any involvement with pruning or removing trees which are the subject of this report.

8 Limitations

- The tree assessment was undertaken for the purpose of pre-development planning. Detailed tree risk assessment was not requested or included in the scope of works.
- The findings of this report are based upon and limited to visual examination of trees from ground level without any climbing, internal testing or exploratory excavation.
- This report reflects the health and structure of trees at the time of inspection. Bluegum cannot guarantee that a tree will be healthy and safe under all circumstances or for a specified period of time. There is no guarantee that problems or defects with assessed trees, will not arise in the future. Liability will not be accepted for damage to person or property as a result of failure of assessed trees.
- This report must be read in its entirety. No part of this report may be referred to, verbally or in writing, unless taken in full context of the whole report.

Attachment A: TREE ASSESSMENT DEFINITIONS

Height. Tree height is estimated from ground level. This assessment is made independently of data plotted on survey plan. These measurements have not been confirmed with clinometer or other surveying instrument.

Diameter at Breast Height (DBH). Trunk diameter is measured at 1.4 metres above ground level. A diameter tape is used which calculates the diameter from a measurement of the circumference. DBH is primarily used for the calculation of the TPZ. The trunk diameter above the root buttress is measured to calculate the Structural Root Zone. If a tree has more than 4 trunks, the diameter of the four largest trunks is recorded. For irregular trunk formations the DBH is calculated as outlined in Appendix A of AS4970-2009 - *Protection of Trees on Development Sites*.

Canopy Spread Radius. Average canopy spread radius is estimated from the centre of trunk to the outer edge of canopy. Refer to Comments column for detail of heavily skewed canopy spread.

Age Class - This is an estimation of the tree's current age class based on size, growth habit, local environmental conditions and comparison with surrounding trees.

- **Immature (IM):** This is a juvenile specimen that is likely to have germinated within the previous 5 years.
- **Early Mature (EM):** This is a tree that is established within its growing environment, though has not reached an age of reproductive maturity or the natural growth habit of a mature individual.
- **Mature (M):** This is a tree has reached both reproductive maturity and a physical form and shape typical for the species. Trees can have a Mature Age Class for the majority of their life span.
- **Late-Mature (LM):** These trees show early signs of senescence with symptoms such as reduced canopy density and an accumulation of dead branches.
- **Over-mature (OM):** These trees show symptoms of irreversible decline such as canopy dieback with dead branches concentrated in the upper canopy.

Health - Good (G), Fair (F) or Poor (P). This is primarily based on the extent of vigorous new foliage growth at branch tips and the colour, size and density of foliage generally. The percentage of live branches to dead branches is considered. The location of any dead branches is also considered. The presence of any pest or disease is considered as part of this assessment. Health can vary with climatic conditions.

Structural Condition - Good (G), Fair (F) or Poor (P). This is an assessment of tree structure and stability. Root anchorage, trunk lean, structural defects, canopy skew and any hazardous features are considered. Dead branches can be considered as part of Structural Condition if they are of a size and location that could cause injury or property damage.

Tree Protection Zone (TPZ). This is a radial distance of (12X) the DBH measured from centre of trunk. TPZ is rounded to the nearest 0.1 metre. A TPZ should not be less than 2m or greater than 15m. The TPZ for palms and other monocots should not be less than 1m outside of the crown projection. Existing constraints to root spread can vary the TPZ. For a tree to remain viable, construction activity should be excluded or undertaken with care within the TPZ. Disturbance within up to 10% of the TPZ area is considered to be a minor encroachment. Disturbance to more than 10% of the TPZ area is considered a major encroachment. Major encroachment into the TPZ is possible depending on the type of disturbance, and species tolerance to disturbance. Exploratory excavation may be required to quantify the presence of roots at the alignment of proposed ground disturbance. This is based upon the Australian Standard AS 4970, 2009, *Protection of trees on development sites* and the Matheney & Clarke "Guidelines for adequate tree preservation zones for healthy, structurally stable trees".

Structural Root Zone (SRZ). This is a radial distance based on the following formula- $SRZ = (D \times 50)^{0.42} \times 0.64$ (for trees less than 150mm Diameter, a minimum SRZ of 1.5 metres). The **D** in the formula is the trunk diameter measured above the root buttress. This was recorded in the field notes. SRZ measurements are rounded to the nearest 0.1m. The Structural Root Zone is the area of soil and roots required to maintain tree stability. Excavation within the SRZ can result in whole tree failure. Fully elevated construction is possible within SRZ with specific rootzone assessment. Existing constraints to root spread can vary the SRZ. This method of determining SRZ is outlined at Section 3.3.5 of Australian Standard AS 4970, 2009, *Protection of trees on development sites*.

Estimated Remaining Life Expectancy: This gives a length of time that the Arborist believes a particular tree can be retained from the time of assessment with an acceptable level of risk based on the information available at the time of the inspection. This system of rating does not take into consideration the likely impacts of any proposed development. Ratings are **Long** (retainable for 30 years or more with an acceptable level of risk), **Medium** (retainable for 10-30 years), **Short** (retainable for 0-10 years) and **Removal** (tree requiring removal due to risk/hazard or absolute unsuitability).

Landscape & Environmental Significance*. This is an assessment of the impact of the tree on the surrounding landscape amenity and natural environment. Rarity, habitat value, physical prominence, historical and cultural significance of the tree are considered in this rating system. The Landscape & Environmental Value ratings used in this report are:

- 1. Very High Value:** This is an outstanding specimen that holds irreplaceable environmental, landscape or cultural value.
- 2. High Value:** An excellent specimen that holds environmental, landscape or cultural value that is present in other site trees or that could be replaced.
- 3. Moderate Value:** Can be a good to fair specimen with environmental, landscape or cultural value that is common within other trees in the locality.
- 4. Low Value:** Removal would not result in any loss of site amenity or environmental value. Can include undesirable or weed species or trees growing in unsuitable locations.
- 5. Very Low Value:** Dead or hazardous with no other environmental or cultural value. Could also include weed species. These trees should be removed or pruned in a way to make safe irrespective of any development.

***Note:** The concept of using a five (5) point scale to assess tree significance was derived from the Tree Wise Men® Australia Pty Ltd ©Significance Rating Scale.

Retention Value*. Retention values are derived from a combination of Estimated Life Expectancy rating and Landscape and Environmental Significance ratings.

Landscape & Environmental Significance		Estimated Life Expectancy			
		Long	Medium	Short	Removal
	Very High (1)	HIGH		MEDIUM	
	High (2)				
	Medium (3)	MEDIUM		LOW	
	Low (4)				
	Very Low (5)				

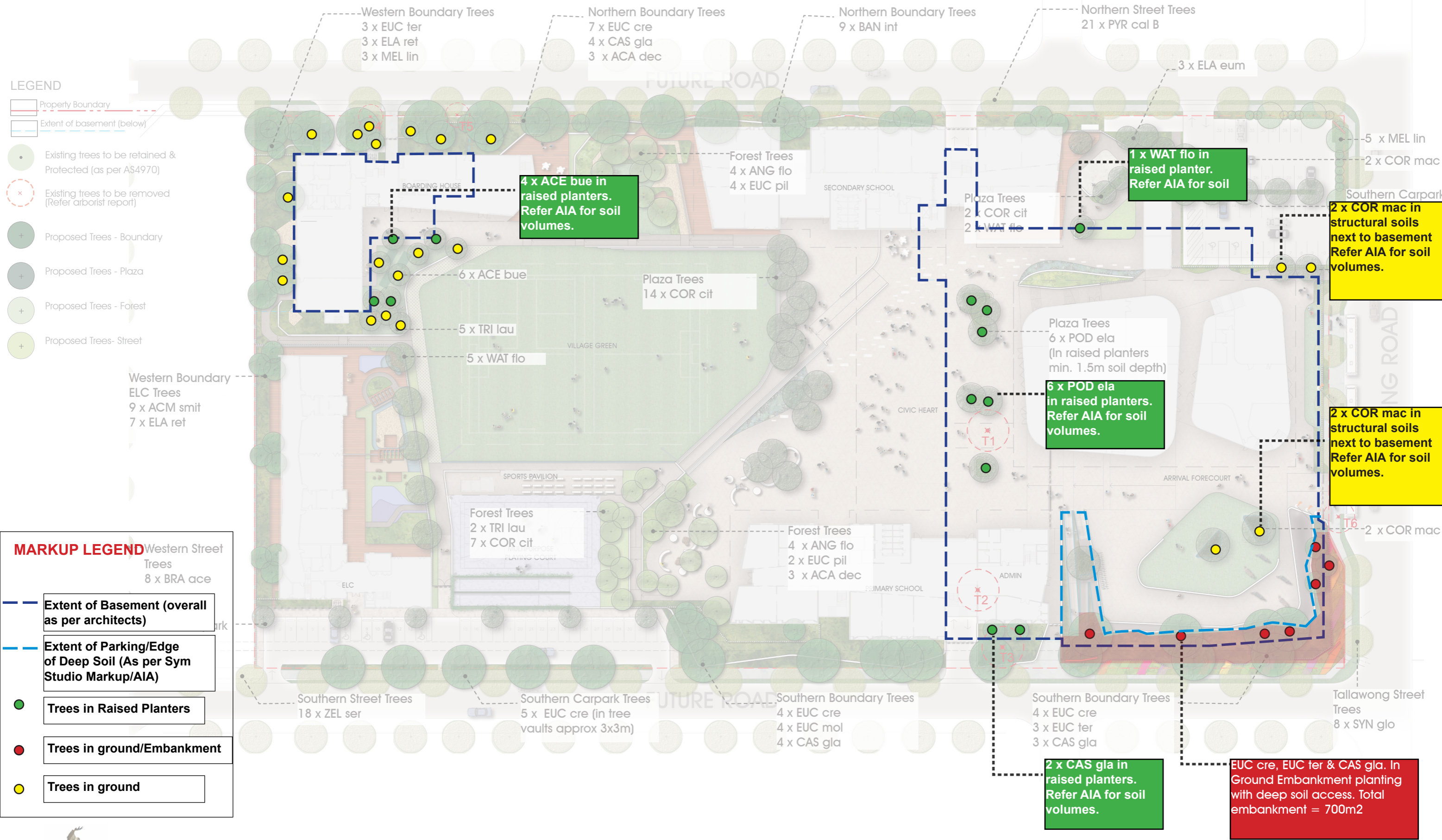
HIGH Retention Value: These trees are worthy of retention and major design consideration should be made where feasible to allow this.

MEDIUM Retention Value: These trees are worthy of retention and minor design consideration should be made to retain these trees wherever possible (e.g. placement of ancillary structures, garden retaining walls, driveway levels).

LOW Retention Value: These trees should not be considered to be a constraint to design layout. Some of these trees should be removed irrespective of any proposed development.

***Note:** The method of determining and defining retention values used in this report has been derived from the ©Retention Index developed by Tree Wise Men® Australia Pty Ltd.

MARKUP FOR TREES NEAR/ON BASEMENT (OVER SYM STUDIO PLANTING PLAN 06/11/20)



PMDL

ARCHITECTURE
INTERIORS
MASTERPLANNING

WILLOW TREE
PLANNING

sym. studio
Landscape Planning

1:400@A1
1:800@A3



PMD-SK-001

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