Tree Report

Wahroonga Adventist School
Fox Valley Road Wahroonga

For Stanton Dahl Architects Pty Ltd

March 2013

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Table of Contents

Introduction	1
The school site	2
Present state of the school site trees	3
Discussion	3
The playing field site	6
Conclusions	7
References	7
Tree protection during construction	8
Tree location plan: school site	12
Table 1: School site trees	13
Table 2: SULE categories (after Barrell 1995)	17
Table 3: Trees near proposed retaining wall	18
Plates	19
Disclaimer	29

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Introduction

It is proposed to develop Wahroonga Adventist School K-12 on the site at Fox Valley Rd Wahroonga. The development would entail several stages to be constructed over the next few years including the school and playing field elsewhere on the site.

Several trees are located on the school site and others are located along the street frontage to the east of the site. Most of the trees within the school site are proposed for removal. This report assesses the trees on the school site and in the adjacent street as noted in Table 1 below and comments on the effects of the proposal.

Plans considered are:

- Ground Floor Plan DA12
- Precinct Plan DA 02/P2 dated 18 December 2012
- Subdivision Plan with Future Works SK301 dated 30 January 2013

prepared by Stanton Dahl Architects Pty Ltd.

In the western area of the site it is proposed to construct a playing field. The western edge of the field would be formed by retaining walls footed in an existing fill bank. Several trees of a Threatened Ecological Community are located near the current line of the proposed retaining walls and some may be closer than the radius of their theoretical tree protection zone. Trees in this vicinity are noted in Table 3 below.

The locations of the retaining walls are flexible subject to further assessment and would be constructed so as to avoid and impact on the trees. The additional information which will be required to formulate the final design is to be provided as the project proceeds.

Figure 1: aerial photograph showing school site (lower left) and playing field site (upper right) courtesy of Cumberland Ecology Pty Ltd

The school site

The site is a tapered rectangle with the long axis aligned approximately northeast/southwest. The southeast boundary is to Fox Valley Rd, and the other boundaries are defined by private properties with Sydney Adventist Hospital to the west and south. A site accessway off Fox Valley Rd forms the southwest site boundary.

The land is generally level with a slope down to the northwest in the western areas. The land is within the local government area of Ku-Ring-Gai Council.

Several houses formerly on the site were recently demolished. The former gardens in the northern part of the site were surfaced with compacted fill. The newly installed demountable school buildings occupy the southern part of the site.

Soils are loams and clay loams over clay subsoils of the Glenorie, Gymea or West Pennant Hills soil landscapes derived from the underlying Wianamatta Shale parent rock (Chapman & Murphy 1989). Site vegetation consists of scattered trees, and a row of street trees is located in Fox Valley Rd to the southeast of the site boundary.

Present state of the school site trees

The school site trees are assessed in Table 1 below; tree numbers are noted on the plan attached. Trees were inspected from the ground only and no aerial or subterranean inspections were carried out. Observations of tree structure, tree health and root zone conditions were made during the assessment.

The school site trees are a collection of commonly planted landscape species, some prominent in the landscape and worthy of retention but several are of little value due small size or poor structure.

Discussion

Tree retention

Tree 1 *Lophostemon confertus* (Brushbox), Tree 2 *Brachychiton acerifolius* (Illawarra Flame Tree) and Tree 3 *Jacaranda mimosifolia* (Jacaranda) are located in the accessway and would be retained with setbacks of approximately 7m from the proposed building.

Trees 15 and 16 *Callistemon viminalis* (Weeping Bottlebrush) are street trees in poor health and condition and would be removed.

The row of *Lophostemon confertus* (Brushbox) street trees comprises Trees 20, 21, 22, 23, 24, 25, 26, 28, 29 and 34. These are in good health and in fair condition, although their root systems are causing footpath damage. The setbacks between the trees and the buildings are approximately 12m, sufficient to avoid disturbance of the root systems and the trees would be unaffected. The design and materials of steps and play area would need to be considered where these are in proximity to trees.

All street trees would be retained except for Tree 34 *Liquidambar styraciflua* (Liquidambar), which would be removed at the edge of the proposed access road to the northeast of the site.

A group of *Corymbia citriodora* (Lemon Scented Gum) is located in the south of the site near the street frontage: Trees 17, 18 and 19. Tree 17 is a large mature specimen in good health and condition and is prominent in the landscape. Trees 18 and 19 are poor specimens which have been suppressed and deformed under the crown of Tree 17.

To the west of Tree 17 is a newly constructed timber retaining wall and a bitumen sealed footpath and play area. It is understood that minimal or no root loss occurred during construction and as long as the proposed footpath does not encroach further into the theoretical tree protection zone of Tree 17 (ie 11m radius from the trunk) there would be no additional impact on the tree.

Tree 20 *Acer buergeranum* (Trident Maple) is a small specimen on the boundary and would be retained.

Tree 37 *Chamaecyparis obtusa* (Hinoki False Cypress) is one of a pair to the northeast of the proposed access road. It would be clear of any likely excavation disturbance, but would need to be fenced to a radius of 6m from the trunk except where access is required for construction of the road. Any carpark fill within this radius should be removed and the tree protection zone covered with a 75mm depth of composted mulch.

Tree removal
With the exception of Trees 17, 18 and 19 *Corymbia citriodora* (Lemon Scented Gum) and Tree 20 *Acer buergeranum* (Trident Maple) as noted above, all the trees within the site are proposed for removal.

Some are of minor landscape value:

Tree 4 *Juniperus chinensis* (Chinese Juniper) is a poor specimen with a one-sided crown.

Tree 5 *Ligustrum lucidum* (Large-leaf Privet) is an unusual yellow-foliaged specimen but has little value.

Tree 8 *Ligustrum sinense* (Small-leaf Privet) is of a noxious weed species.

Tree 9 *Ginkgo biloba* (Maidenhair Tree) is a small specimen in declining health.

Tree 12 *Acer palmatum* (Japanese Maple) is sparse and stressed.

Tree 13 *Brachychiton acerifolius* (Illawarra Flame Tree) is a malformed specimen with a leaning lower trunk.

Tree 14 *Lagerstroemia indica* (Crepe Myrtle) is a fair specimen but not of great landscape value.

Tree 30 *Liquidambar styraciflua* (Liquidambar) is a small specimen of minor landscape value.

Tree 31 *Chamaecyparis obtusa* (Hinoki False Cypress) is a small suppressed specimen.

Tree 32 is an unidentified rainforest species with poor form although with some minor landscape value for its prominence near the boundary.

Tree 35 *Pittosporum undulatum* (Native Daphne) is a small and suppressed specimen with minimal landscape value.

Tree 38 *Brachychiton acerifolius* (Illawarra Flame Tree) is of a species which is listed as a 'nuisance' under Ku-Ring-Gai Council's Weed Management Policy 2007.

However several trees considered to be of landscape value are proposed for removal within the site:

Trees 6 and 7 *Chamaecyparis obtusa* (Hinoki False Cypress) are located between the existing footpaths. These are a pair of conifers prominent in the street corner of the site. They are in good health and condition but are proposed to be removed in order to open up the corner as part of the school entry.

Tree 10 *Liquidambar styraciflua* (Liquidambar) is a large specimen and prominent in the landscape near the street frontage. It is approximately at the height below which the species becomes exempt from the provisions of the Ku-Ring-Gai Council Tree Preservation Order.

Tree 11 *Jacaranda mimosifolia* (Jacaranda) is a fair specimen but is not significant in the landscape and is not worthy of the changes to the design which its retention would require.

Tree 27 *Liquidambar styraciflua* (Liquidambar) is a large and prominent specimen in good health and in fair structural condition. The chief adverse factor is the coverage of the root zone by a compacted fill for the carpark surface: this replaces the formerly existing soft soil garden. The fill is likely to cause rapid decline and death of major roots. The species is exempt from the Ku-Ring-Gai Council Tree Preservation Order if less than 12m in height and this is an indication that the species is considered to be a nuisance. Tree 27 is over 12m in height and is this subject to the Tree Preservation Order. The School would currently prefer to obtain approval for its removal and intends to re-evaluate whether or not to remove it when the Junior School stage proceeds in the future.

However to enable a future decision to be made at the Junior School development stage the continued health of the tree should be ensured. The fill should be carefully removed to a radius of 6m from the trunk without causing injury to roots and the former soil surface covered with a 75mm depth of composted mulch. This area should be fenced to form a tree protection zone.

Tree 33 *Cedrus deodara* (Himalayan Cedar) is a mature and prominent specimen in good health but with large lower branches which detract from the typically pyramidal form of the species. The root system is covered by carpark fill which is likely to cause significant injury to the root system. The tree would be located near the edge of the proposed access road and is proposed for removal.

To ensure the retention of the tree until the Junior School stage proceeds, the fill should be carefully removed to a radius of 8m from the trunk without causing injury to roots and the former soil surface covered with a 75mm depth of composted mulch. This area should be fenced to form a tree protection zone.

Tree 36 *Chamaecyparis obtusa* (Hinoki False Cypress) is one of a well-grown pair but would be within the proposed access road and is proposed for removal.

In addition to removals from within the site, Tree 34 *Liquidambar styraciflua* (Liquidambar) is a large street tree which would be removed due to its proximity to the proposed access road.

The playing field site

The northern area of the playing field site slopes down to the edge of the forest. This bank is composed of fill. As noted in *Report on Geotechnical Desktop Study* dated November 2012 prepared by Douglas Partners Pty Ltd:

a raised fill platform with a batter slope of approximately 3:1 (H:V) and approximately 3 m to 4 m high extends between the grassed field and the bushland below

It is proposed to fill part of the site to new design levels and retain the fill with retaining walls.

To assess likely design issues the approximate locations of the proposed retaining walls were marked with pegs. An inspection of the forest edge to the west of the existing fill bank showed that 14 trees are located close to the line of the proposed retaining walls as noted in Table 3 below. Several trees are old individuals of *Syncarpia glomulifera* (Turpentine) with multiple stems; other trees include mature specimens of *Eucalyptus pilularis* (Blackbutt), *Eucalyptus globoidea* (White Stringybark) and *Angophora costata* (Sydney Red Gum).

The trunk diameters were measured and indicative theoretical tree protection zone radii according to Australian Standard AS 4970 *Protection of trees on development sites* were assigned to each tree. At present the radii cannot be used to design the retaining walls: the Standard allows for root investigation where major encroachment (ie >10% of the theoretical tree protection zone area) may occur and at this stage this investigation has not been undertaken. It appears that the theoretical tree protection zone of a few trees extends within the current line of the retaining walls.

However it is noted that a significant depth of fill has been deposited in the past and the toe of this fill area extends to within a few metres of the closest trees, including major specimens as noted in the table. The trees appear in good vigour and it is evident that the fill deposited in the past has not adversely affected their health.

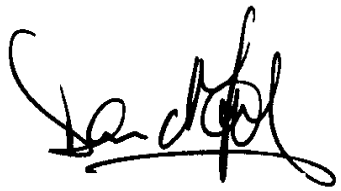
To make an assessment as to likely impact, the depth and composition of the existing fill including its permeability, the hydrology of the fill and the slope, the location of the trees in relation to the retaining walls and the disposition of the root systems would be required. This information will be provided as the project proceeds. It is acknowledged that continuity of the forest in good health is paramount and the design of the playing field will be amended as required to avoid any impact.

Conclusions

Most of the trees on the school site are proposed for removal and although some are small and not prominent, several mature trees to be removed are of considerable landscape value for their size and prominence. The landscape plan will provide replacement plantings which would address any loss of tree amenity in the area.

Trees in the street frontage would be retained and protected during construction although one street tree is proposed for removal.

The health of the trees near the proposed fill and retaining walls on the playing field site would be the primary consideration of the design. Additional information is required before the final design of the walls can be determined.



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Consulting Arborist

References

Barrell, J. 1993, 'Preplanning Tree Surveys: Safe Useful Life Expectancy (SULE) is the Natural Progression', *Arboricultural Journal* 17:1, February 1993, pp. 33-46.

Barrell, J. 1995, 'Pre-development Tree Assessments', in *Trees & Building Sites, Proceedings of an International Conference Held in the Interest of Developing a Scientific Basis for Managing Trees in Proximity to Buildings*, International Society of Arboriculture, Illinois, USA, pp. 132-142.

Chapman, G.A. & Murphy, C.L. 1989, *Soil Landscapes of the Sydney 1:100 000 Map Sheet*, Soil Conservation Service of NSW, Sydney.

Standards Australia 2009, Australian Standard AS 4970 *Protection of trees on development sites*, Standards Australia, Sydney.

Tree protection during construction

The following measures should be undertaken to reduce the possible effects of construction on the trees.

Excavation in the vicinity of trees should be done initially by hand. Any roots encountered <50mm in diameter should be cut cleanly with a hand saw. Any roots encountered >50mm in diameter should retained intact and referred to the site arborist for advice.

Prior to the start of construction trees should be fenced (in groups where possible) to a radius of at least 5m from each trunk except where access is required for construction, to form tree protection zones. Fences should be chainlink 1.8m high supported by steel posts.

Where access is required within these radii for building purposes, the fence should be set back 1.5m from the building face and the soil surface between the fence and the building should be protected by plywood sheets or strapped planking.

Where not otherwise protected trunks should be armoured with 2m lengths of 50x100mm hardwood timbers spaced at 150mm centres and secured by 8 gauge wires or steel strapping at 300mm spacing. The trunk protection should be maintained intact until the completion of all work on the site.

There should be no pedestrian or vehicular access to the tree protection zones. No building activities should take place within the tree protection zones, including storage or stockpiling. Runoff from the site should not be allowed to enter the tree protection zones.

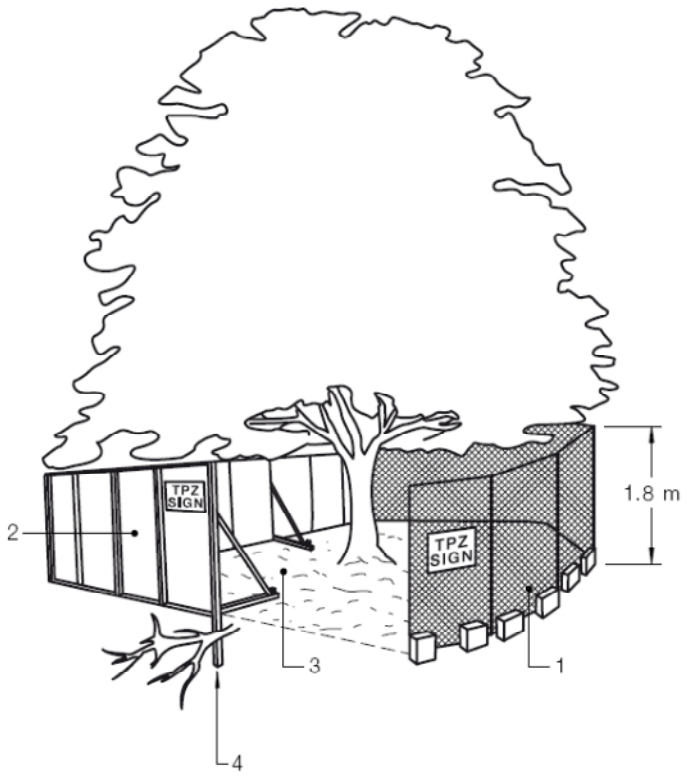
The soil surface within the tree protection zones should be mulched with a layer of composted organic material (Vitagrow Landcure or similar) to a depth of 75mm.

A site arborist should be appointed to supervise any activities in the vicinity of trees, including fencing, excavation and root pruning, and make periodic visits and reports to monitor the state of the trees. Inspection should take place after installation of the fencing, at initial hand excavation and root pruning, during any works within the tree protection zones, at completion of the construction. A photographic record should be maintained of site inspections, including the state of the trees and any injury inflicted.

In the event of any tree to be retained becoming damaged during construction, the site arborist should be informed to inspect and provide advice on remedial action.

At the end of construction all retained trees should be pruned to remove deadwood and weak branches. All pruning should be done in accordance with Australian Standard AS4373- *Pruning of Amenity Trees*.

Guidelines for tree protection are noted in Australian Standard AS4970-2009 *Protection of Trees on Development Sites*. Figures below show fencing, ground protection and scaffold fencing details.



LEGEND:

1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

FIGURE 3 PROTECTIVE FENCING

4.5.2 Trunk and branch protection

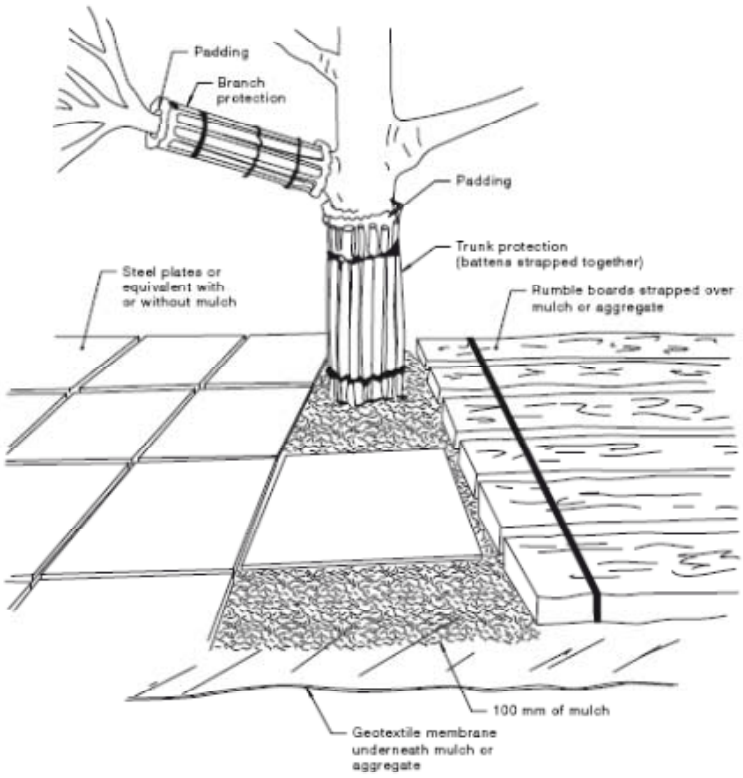
Where necessary, install protection to the trunk and branches of trees as shown in Figure 4. The materials and positioning of protection are to be specified by the project arborist. A minimum height of 2 m is recommended.

Do not attach temporary powerlines, stays, guys and the like to the tree. Do not drive nails into the trunks or branches.

4.5.3 Ground protection

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. Measures may include a permeable membrane such as geotextile fabric beneath a layer of mulch or crushed rock below rumble boards as per Figure 4.

These measures may be applied to root zones beyond the TPZ.

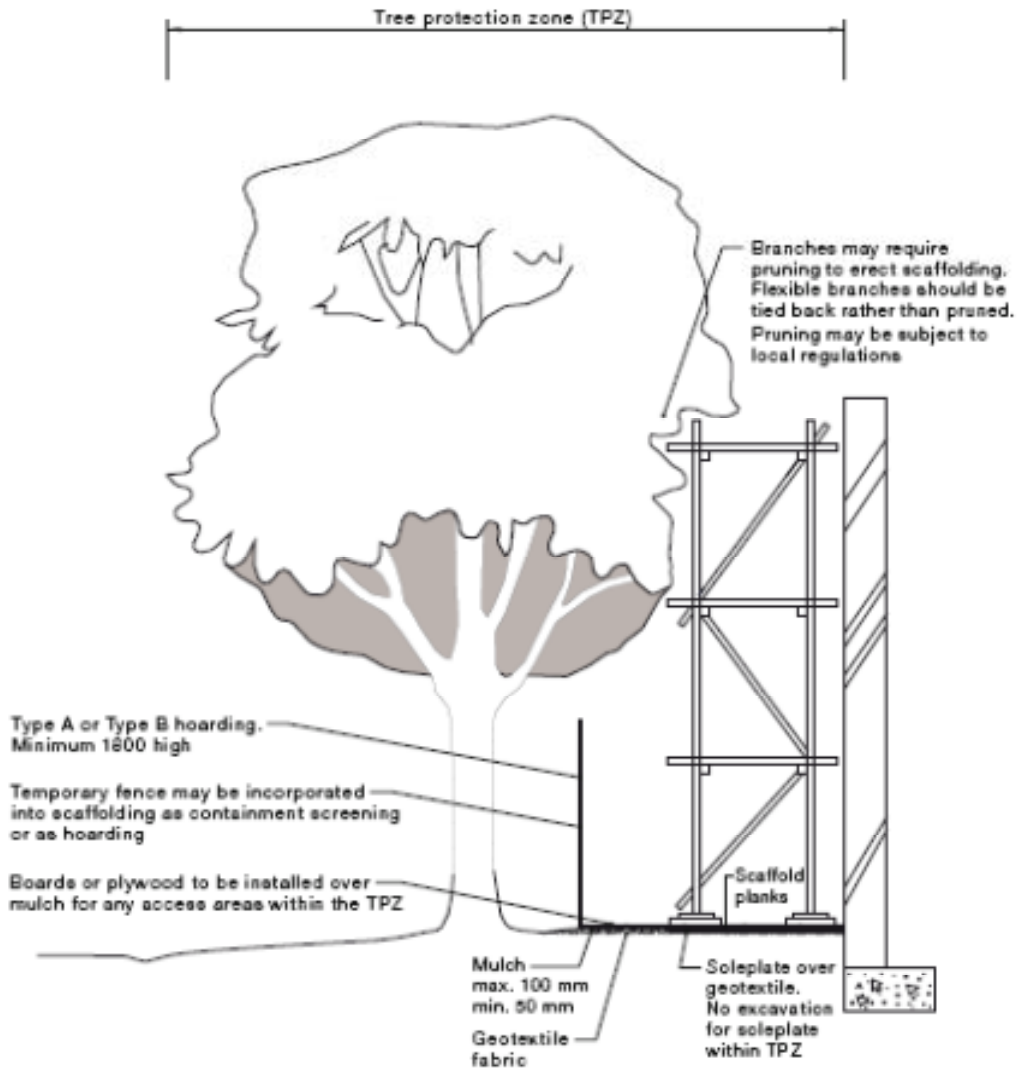


NOTES:

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 should be of a suitable thickness to prevent soil compaction and root damage.

FIGURE 4 EXAMPLES OF TRUNK, BRANCH AND GROUND PROTECTION



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

FIGURE 5 INDICATIVE SCAFFOLDING WITHIN A TPZ

Tree location plan: school site

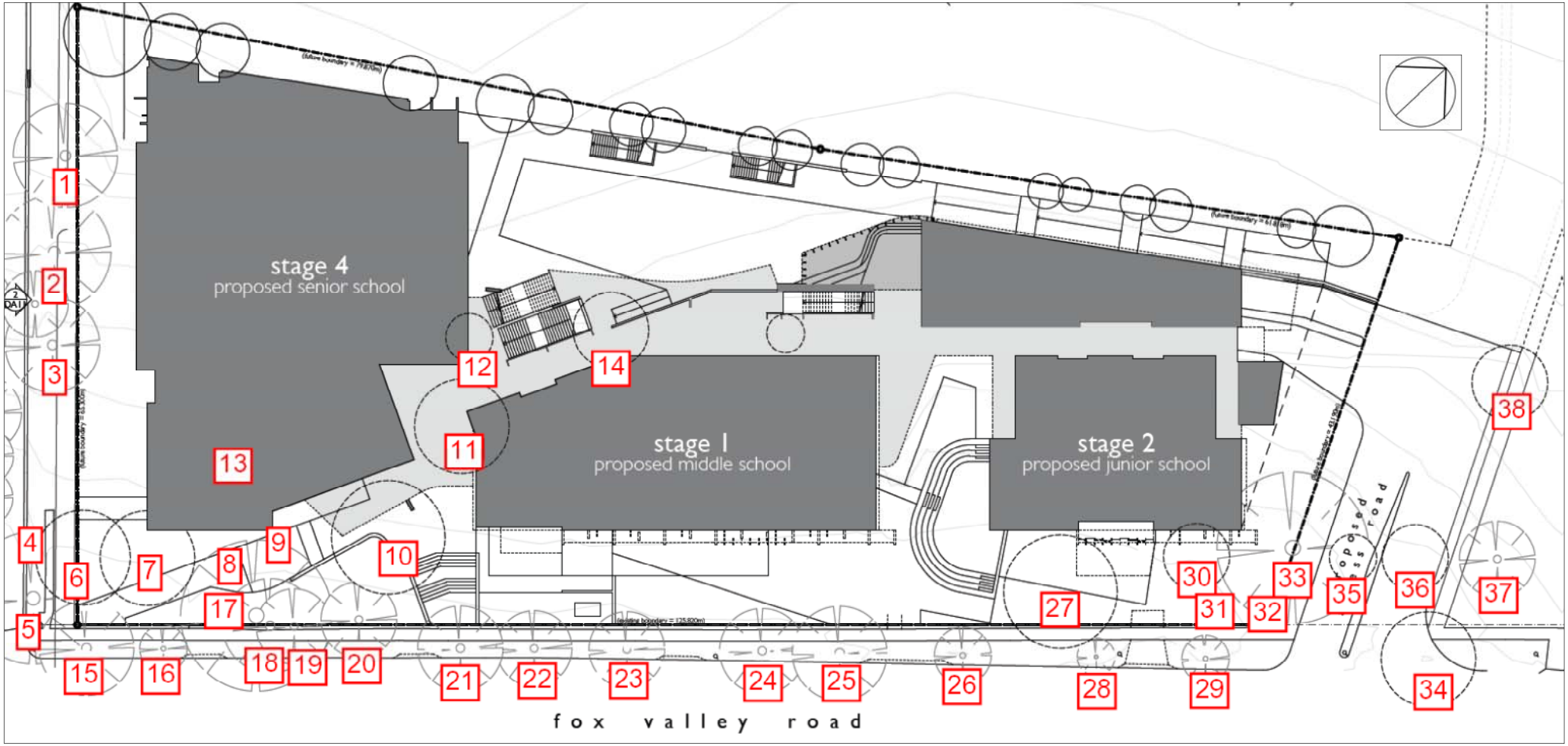


Table 1: School site trees

Tree no	Species	Approx trunk dbh mm	Approx height m	Approx crown spread m	Health	Condition	SULE	Comment	Effect of proposed development
1	*Lophostemon confertus* (Brushbox)	400	12	10	Fair	Good	2D	Codominant crown	Retention
2	*Brachychiton acerifolius* (Illawarra Flame Tree)	650	12	10	Good	Fair	2D	Weak junction at 2m height	Retention
3	*Jacaranda mimosifolia* (Jacaranda)	400	12	12	Good	Good	1A	Minor deadwood	Retention
4	*Juniperus chinensis* (Chinese Juniper)	multi	5	2	Good	Fair	3D	One-sided crown	Removal
5	*Ligustrum lucidum* (Large-leaf Privet)	200 x 2	6	4	Poor	Poor	4A	Declining	Removal
6	*Chamaecyparis obtusa* (Hinoki False Cypress)	600 bf	10	8	Good	Fair	2B	Weak junctions near base	Removal
7	*Chamaecyparis obtusa* (Hinoki False Cypress)	600 bf	10	8	Good	Fair	2B	Weak junctions near base	Removal
8	*Ligustrum sinense* (Small-leaf Privet)	Multi	4	2	Fair	Poor	4C	Weed species	Removal
9	*Ginkgo biloba* (Maidenhair Tree)	100 x 3	8	6	Fair	Poor	3A	Declining	Removal
10	*Liquidambar styraciflua* (Liquidambar)	600	12	14	Good	Fair	2B	Root system confined by retaining walls	Removal

Tree no	Species	Approx trunk dbh mm	Approx height m	Approx crown spread m	Health	Condition	SULE	Comment	Effect of proposed development
11	*Jacaranda mimosifolia* (Jacaranda)	400	10	12	Good	Fair	2D	Leaning codominant crown	Removal
12	*Acer palmatum* (Japanese Maple)	300	6	6	Fair	Fair	3A	Sparse crown Stressed	Removal
13	*Brachychiton acerifolius* (Illawarra Flame Tree)	300	7	4	Good	Fair	2D	Leaning lower trunk	Removal
14	*Lagerstroemia indica* (Crepe Myrtle)	Multi	6	8	Good	Fair	2D	On bank	Removal
15	*Callistemon viminalis* (Weeping Bottlebrush)	400 bf	8	6	Fair	Fair	4A	Sparse crown declining	Retention
16	*Callistemon viminalis* (Weeping Bottlebrush)	250	6	4	Fair	Fair	3D	Sparse crown	Retention
17	*Corymbia citriodora* (Lemon Scented Gum)	900	25	22	Good	Fair	2D	Branch failures Root system confined by footpath and retaining wall	Retention
18	*Corymbia citriodora* (Lemon Scented Gum)	450	18	15	Fair	Poor	3B	Leaning over road Suppressed	Retention
19	*Corymbia citriodora* (Lemon Scented Gum)	300	10	6	Poor	Poor	3B	Suppressed Broken leader	Retention
20	*Acer buergeranum* (Trident Maple)	250 x 3	6	6	Good	Fair	3C	Root system confined by footpath	Retention

Tree no	Species	Approx trunk dbh mm	Approx height m	Approx crown spread m	Health	Condition	SULE	Comment	Effect of proposed development
21	*Liquidambar styraciflua* (Liquidambar)	450	10	8	Good	Fair	2B	Root system confined by footpath and road Pruning cuts on trunk	Retention
22	*Liquidambar styraciflua* (Liquidambar)	400	10	8	Good	Fair	2B	Root system confined by footpath and road	Retention
23	*Liquidambar styraciflua* (Liquidambar)	500	10	8	Good	Fair	2B	Root system confined by footpath and road	Retention
24	*Liquidambar styraciflua* (Liquidambar)	400	10	8	Good	Fair	2B	Root system confined by footpath and road	Retention
25	*Liquidambar styraciflua* (Liquidambar)	450	10	8	Good	Fair	2B	Root system confined by footpath and road Root system damage to footpath	Retention
26	*Liquidambar styraciflua* (Liquidambar)	300	10	8	Good	Fair	2B	Root system confined by footpath and road Root system damage to footpath	Retention
27	*Liquidambar styraciflua* (Liquidambar)	500	14	12	Good	Fair	2D	Carpark fill over root system	Removal
28	*Liquidambar styraciflua* (Liquidambar)	250	6	6	Good	Fair	3D	Root system confined on 3 sides by roadways	Retention
29	*Liquidambar styraciflua* (Liquidambar)	250 x 2	6	5	Good	Poor	3D	Stem in basal junction	Retention
30	*Liquidambar styraciflua* (Liquidambar)	300	8	6	Good	Fair	2D	Carpark fill in root zone	Removal

Tree no	Species	Approx trunk dbh mm	Approx height m	Approx crown spread m	Health	Condition	SULE	Comment	Effect of proposed development
31	*Chamaecyparis obtusa* (Hinoki False Cypress)	200	6	4	Fair	Fair	4A	Suppressed	Removal
32	Rainforest sp.	200 x 3	8	8	Good	Fair	2D	Weak junction at trunk base	Removal
33	*Cedrus deodara* (Himalayan Cedar)	700	12	14	Good	Fair	2D	Carpark fill in root zone	Removal
34	*Liquidambar styraciflua* (Liquidambar)	500	10	10	Good	Fair	2D	Root system confined by footpath and road Girdling root	Removal
35	*Pittosporum undulatum* (Native Daphne)	250	6	4	Good	Fair	4A	Suppressed	Removal
36	*Chamaecyparis obtusa* (Hinoki False Cypress)	500 bf	10	8	Good	Good	2D	Codominant subtrunks	Removal
37	*Chamaecyparis obtusa* (Hinoki False Cypress)	500 bf	10	8	Good	Good	2D	Codominant subtrunks	Retention
38	*Brachychiton acerifolius* (Illawarra Flame Tree)	400	8	6	Good	Fair	2D	Carpark fill in root zone	Removal

Table 2: SULE categories (after Barrell 1995)

	1	2	3	4
	Long: Appeared to be retainable at the time of assessment for over 40 years with an acceptable degree of risk, assuming reasonable maintenance.	Medium: appeared to be retainable at the time of assessment for 15 to 40 years with an acceptable degree of risk, assuming reasonable maintenance.	Short: appeared to be retainable at the time of assessment for 5 to 15 years with an acceptable degree of risk, assuming reasonable maintenance.	Transient: trees which should be removed within the next 5 years.
A	Structurally sound trees located in positions that can accommodate future growth.	Trees which may only live between 15 and 40 years.	Trees which may only live between 5 and 15 years.	Dead, dying, suppressed or declining trees.
B	Trees which could be made suitable for long-term retention by remedial care.	Trees which may live for more than 40 years but would be removed for safety or nuisance reasons.	Trees which may live for more than 15 years but would be removed for safety or nuisance reasons.	Dangerous trees through damage, structural defect, instability or recent loss of adjacent trees. Urgent removal may be required if near assets.
C	Trees of special significance which would warrant extraordinary efforts to secure their long-term retention.	Trees which may live for more than 40 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting.	Trees which may live for more than 15 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting.	Trees which may live for more than 5 years but should be removed to prevent interference with more suitable individuals or to provide space for new planting.
D		Trees which could be made suitable for retention in the medium term by remedial care.	Trees which require substantial remediation and are only suitable for retention in the short term.	Trees which are damaging or may cause damage to existing structures within the next 5 years.

Table 3: Trees near proposed retaining wall

Tree no	Species	Location	Trunk diameter mm	Theoretical tree protection zone radius m
1	*Syncarpia glomulifera* (Turpentine)	Peg 1: 7m northwest	900 750 400 400 = 1310	15
2	*Syncarpia glomulifera* (Turpentine)	Peg 1: 10m north	750 550 = 940	11.3
3	*Eucalyptus pilularis* (Blackbutt)	Peg 2: 6.5m north	500	6
4	*Syncarpia glomulifera* (Turpentine)	Pegs 2 to 3: 12m east of Peg 2; 6m north of line	700	8.4
5	*Angophora costata* (Sydney Red Gum)	Pegs 2 to 3: 20m east of Peg 2; 3m north of line	300	3.6
6	*Syncarpia glomulifera* (Turpentine)	Pegs 2 to 3: 35m east of Peg 2; 3m north of line	600 500 500 400 400 300 = 1580	15
7	*Angophora costata* (Sydney Red Gum)	Pegs 2 to 3: 41m east of Peg 2; 8m north of line	500	6
8	*Eucalyptus pilularis* (Blackbutt)	Pegs 2 to 3: 44m east of Peg 2; 1m north of line	300	3.6
9	*Syncarpia glomulifera* (Turpentine)	Pegs 2 to 3: 58m east of Peg 2; 2m north of line	700	8.4
10	*Eucalyptus pilularis* (Blackbutt)	Pegs 2 to 3: 65m east of Peg 2; 6m north of line	700	8.4
11	*Eucalyptus pilularis* (Blackbutt)	Peg 4: 12m north	1000	12
12	*Eucalyptus globoidea* (White Stringybark)	Peg 4: 12m north	600	7.2
13	*Eucalyptus pilularis* (Blackbutt)	Peg 4: 12m north	900	10.8
14	*Eucalyptus pilularis* (Blackbutt)	Pegs 4 to 5: 3m north of line	250	3

Notes:
Trunk diameters were measured
'Line' is rough line of sight between Pegs 2 and 3
Peg 3 had been displaced and then replaced in an approximate location measured 13.5m from Peg 4
Distances north from 'line' were paced
Distances from Peg 2 were paced
Distances from Peg 4 were measured

Plates

Plate 1: Tree 1 *Lophostemon confertus* (Brushbox)

Plate 2: Tree 2 *Brachychiton acerifolius* (Illawarra Flame Tree)

Plate 3: Tree 3 *Jacaranda mimosifolia* (Jacaranda)

Plate 4: Trees 6 and 7 *Chamaecyparis obtusa* (Hinoki False Cypress); Tree 4 *Juniperus chinensis* (Chinese Juniper) to the right

Plate 5: Tree 10 *Liquidambar styraciflua* (Liquidambar)

Plate 6: Tree 11 *Jacaranda mimosifolia* (Jacaranda); Tree 12 *Acer palmatum* (Japanese Maple) to the rear

Plate 7: Tree 14 *Lagerstroemia indica* (Crepe Myrtle)

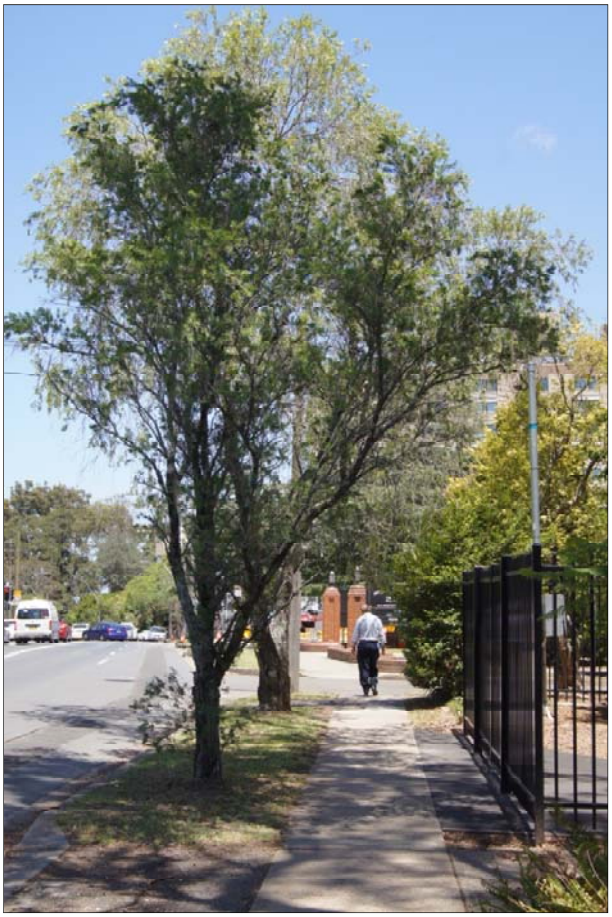


Plate 8: Trees 15 and 16 *Callistemon viminalis* (Weeping Bottlebrush)

Plate 9: Trees 17, 18 and 19 *Corymbia citriodora* (Lemon Scented Gum); Tree 9 *Ginkgo biloba* (Maidenhair Tree) to the front

Plate 10: Trees 20 to 23 *Liquidambar styraciflua* (Liquidambar)

Plate 11: Tree 29 *Liquidambar styraciflua* (Liquidambar)

Plate 12: Tree 27 *Liquidambar styraciflua* (Liquidambar)

Plate 13: Tree 30 *Liquidambar styraciflua* (Liquidambar) right and
Tree 33 *Cedrus deodara* (Himalayan Cedar) left

Plate 14: Trees 36 and 37 *Chamaecyparis obtusa* (Hinoki False Cypress)

Plate 15: western edge of playing field site between Pegs 3 and 4 showing proximity of trees to existing fill

Plate 16: multi-stemmed mature specimen of *Syncarpia glomulifera* (Turpentine) near edge of fill bank

Terminology used in the report

Age classes (I) *Immature* refers to a well-established but juvenile tree. (S) *Semimature* refers to a tree at growth stages between immaturity and full size. (M) *Mature* refers to a full sized tree with some capacity for further growth. (O) *Overmature* refers to a tree about to enter decline or already declining.

Health refers to the tree's vigour as exhibited by the crown density, leaf colour, presence of epicormic shoots, ability to withstand disease invasion and the degree of dieback.

Condition refers to the tree's form and growth habit, as modified by its environment (aspect, suppression by other trees, soils), and the state of the scaffold (ie trunk and major branches), including structural defects such as cavities, crooked trunks or weak trunk/branch junctions. These are not directly connected with health and it is possible for a tree to be healthy but in poor condition.

Health	
Good	In good vigour with full leaf coverage of the crown; deadwood if present is internal and a normal feature of the species
Fair	Generally vigorous but shows symptoms of stress or decline, leaf coverage thinner than normal for the species; deadwood of smaller diameter may be present
Poor	Shows symptoms of advanced stress or decline including sparse crown with twig and branch dieback, lack of response to pests or disease
Structural condition	
Good	Has well-spaced branches and strong branch collars; form and habit typical of the species; good example of the species with low probability of significant failure
Fair	Has structural defects of moderate severity with low propensity for failure which could be remediated by pruning or modification of its environment
Poor	Has structural defects which have already failed and/or have a high propensity for failing in the future

Safe Useful Life Expectancy (SULE). In a planning context, the time a tree can expect to be usefully retained is the most important long-term consideration. SULE is a system designed to classify trees into a number of defined categories so that information regarding tree retention can be concisely communicated in a non-technical manner. SULE categories are easily verifiable by experienced personnel without great disparity. A tree's SULE category is the life expectancy of the tree modified first by its age, health, condition, safety and location (to give safe life expectancy), then by economics (ie cost of maintenance; retaining trees at an excessive management cost is not normally acceptable), effects on better trees, and sustained amenity (ie establishing a range of age classes in a local population). SULE assessments are not static but may be modified as dictated by changes in tree health and environment. Trees with short SULE may at present be making a contribution to the landscape but their value to the local amenity will decrease rapidly towards the end of this period, prior to their being removed for safety or aesthetic reasons. For details of SULE categories see Table 2, adapted from Barrell (1993 and 1995).

Decay is the result of invasion by fungal diseases through a wound.

Decline is the response of the tree to a reduction of energy levels resulting from **stress**. Recovery from a decline is difficult and slow; is usually irreversible.

Sparse crown refers to reduced leaf density, often a precursor to dieback and may imply stress or decline. Also possibly a response to drought or root damage.

Stress refers to the response of the tree to a reduction of energy levels resulting from adverse influences such as altered soil conditions (compaction, poor nutrition, reduced oxygen or moisture levels), root damage, toxicity, drought, waterlogging; may be reversible given good arboricultural practices but may lead to **decline**.

Theoretical tree protection zone is the 'tree protection zone radius' as calculated from Australian Standard 4970-2009 *Protection of Trees on Development Sites*. However root mapping investigations increasingly show that the tree protection zone calculation of 12x trunk diameter is seldom relevant in practice and the theoretical tree protection zone may be considerably larger than the actual root zone or radically different in disposition.

Weak junctions are points of possible failure in the scaffold. They are usually caused by the trunk or branch bark being squeezed within the junction so that the necessary interlocking of the wood fibres does not occur and the junction is forced open by the annual increments in growth. This is often a genetic problem.

Wounds are areas where the bark has been damaged by branch breakage, impact or insect attack. Some wounds decay and cause structural defects or weakness. Healthy trees are able to resist and contain infection by walling off areas within the wood. Tree wounds are often eventually covered over by new bark but the walled off or infected areas still remain internally and may lead to weakness of the heartwood.

Disclaimer

This is not a hazard assessment report and it should be noted that trees are always inherently dangerous. This assessment was carried out from the ground, and covers what was reasonably able to be assessed and available to the assessor at the time of inspection. No aerial or subterranean inspections were carried out and structural weakness may exist within roots, trunk or branches.

Any protection or preservation methods recommended are not a guarantee of tree survival or safety but are designed to improve vigour and reduce risk. Timely inspections and reports are necessary to monitor the trees' condition. No responsibility is accepted for damage or injury caused by the trees and no responsibility is accepted if the recommendations in this report are not followed.

Limitations on the use of this report

This report is to be utilised in its entirety only. Any written or verbal submission, report or presentation that includes statements taken from the findings, discussions, conclusions or recommendations made in this report, may only be used where the whole of the original report (or a copy) is referenced in, and directly attached to that submission, report or presentation.

Assumptions

Care has been taken to obtain information from reliable resources. All data have been verified insofar as possible; however, Treescan Urban Forest Management can neither guarantee nor be responsible for the accuracy of information provided by others.

Unless stated otherwise:

Information contained in this report covers only the trees that were examined and reflects the condition of the trees at the time of inspection: and

The inspection was limited to visual examination of the subject trees without dissection, excavation, probing or coring. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the subject trees may not arise in the future.