

# Construction Impact Assessment and Management Plan



# The Scots College, Macintyre House and Courts.

# Bellevue Hill, Sydney.

Prepared For: The Scots College. Prepared By: George Palmer, Botanics.

Dated: October, 2019.

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## 1. Summary

1.1 This report has been requested by Adair Architects on behalf of The Scots College to better understand the arboricultural implications associated with the proposed works detailed here. These works will require the excavation and reconfiguration of these courts in conjunction with the construction of underground parking facilities. These works are part of a significant redevelopment process that fulfil The Scots College's mission to become a world class school and encourage the development of generations of students for the betterment of society.

1.2 A total of twenty (20) trees have been individually assessed for the purpose of this report. These are located within 15m of the proposed construction footprint. The remainder of the trees on site are located over 15m from the proposed Construction Impact Zone (CIZ) and have not been assessed here.

1.3 There are two (2) historically significant trees documented here. Both are located outside the construction impact zone (CIZ) and will not be affected by the proposed. Trees 1 and 2 are both well established and significant *Ficus microcarpa variety Hillii*, or Hills Weeping Fig trees. These are both located adjacent to the College's Cranbrook Road boundary and have Tree Protection Zone's (TPZ) that extend to within the CIZ of the proposed works. Consideration has been given to their long term preservation and both construction setbacks made to ensure retention.

1.4 The proposed works will require the removal of nine (9) *Citharexylum*, or Fiddlewood trees adjacent to the site's eastern Cranbrook Lane boundary. These have mostly been planted within 400mm of the sandstone boundary wall and have started to affect its structural integrity. All have been considered as Low Value for a number of arboricultural reasons.

1.5 Two (2) *Harpephyllum*, or Wild Plums appear to have seeded again, adjacent to the site's eastern boundary. These are an exotic tree species with a biological potential not suited to this location. Both have been considered as Low Value and would be recommended for removal irrespective of the proposed development.

1.6 Additional trees required for removal include a juvenile to semi mature *Agonis*, or West Australian Peppermint and a similar *Lophostemon*, or Brush Box. A semi mature *Casuarina*, or She Oak is similarly required for removal. All are located adjacent to the site's eastern Cranbrook Lane boundary and have been considered as Low to Moderate Value. Removal recommendations here have not been made without due consideration, and only trees required for removal have been recommended for removal.

1.7 The site's most arboriculturally significant trees have been seen as being a material constraint to the development process and have been reflected within the design.

1.8 Preservation recommendations have been made based on *Australian Standard AS4970 for the Protection of Trees on Development Sites* and will be implemented accordingly. All tree pruning recommendations will be made based on *AS4373 for the Pruning of Amenity Trees* and will be undertaken where appropriate.



# 2. Background

2.1 The Scots College makes an ongoing commitment to lead its students to discover and make the most of their talents. The proposed development extends this commitment and it is hoped will enable The College to continue to become a world leader in education and physical development.

2.2 The proposed works will better utilise this building footprint and create a more functional use of the space. The works will also reduce the number of cars on the surrounding streets and better facilitate vehicular movements into and out of the school.

## 3. Aims

3.1 The aims of this report are to;

- Review Council Policies for applicable conditions regarding the site and documented trees;
- Conduct a visual assessment of the documented trees and their growing environment;
- Provide a detailed list of Tree Preservation Recommendations aimed at preserving those trees documented for preservation.

3.2 There is no warranty or guarantee, expressed or implied that health, pests, disease, deficiencies, decay or any structural failures may occur at any time following documentation. Information contained in this report covers only the documented trees and reflects their health and condition at the time of inspection.

## 4. Methodology

4.1 A Visual Tree Assessment (VTA) was performed from ground level and consideration was given to the overall health of each tree, percentage of canopy, epicormic growth, deadwood and form for this species. The tree heights and canopy spreads have been estimated and where relevant the orientation of the canopy spread noted. The trunk diameters of each tree has been estimated at breast height of 1.4 meters (DBH) and measured with a diameter tape where required to calculate Tree Protection Zones. The site was originally inspected by consulting arborist George Palmer in October, 2019.

### 5. Observations

5.1 The site area extends east from the Cranbrook Road down to the tennis courts and current vehicular access to the oval from Cranbrook Lane. The embankment from Cranbrook Road slopes down from the footpath and has been retained via a number of low sandstone block. These structures and the extended development of the mature Hills Figs (Trees 1 and 2) provide for this batter.

5.2 The remainder of the site is relatively level comprising four (4) tennis courts and a portion of the school's primary sports oval. As noted, limited vehicular access is provided to this oval via a driveway from Cranbrook Lane.

5.3 The tennis courts and existing building footprints appear to have limited the abiotic development of tree roots. The proposed works extend to within the theoretical TPZ of Trees 1 and 2. The practical impacts of this will however be limited here.



# 6. Tree Data

6.1 A total of twenty (20) trees have been assessed using Visual Tree Assessment (VTA) criteria and notes. As required under Clause 2.3.2 of the *Australian Standard 4970 (2009) for the Protection of Trees on Development Sites,* each tree has been allocated a Retention Value based on the tree's Useful Life Expectancy and Landscape Significance with consideration to its health, structure, condition and site suitability. The Retention Value does not take into account any proposed development. All trees have been allocated 1 of 4 Retention Values;

- High Value Priority for Retention.
- Moderate Value Consider for Retention.
- Low Value Consider for Removal.
- Remove Recommended for Removal Irrespective of works.

Refer to Tree Table and Tree Assessment Schedule.

6.2 These range in significance from remnant plantings of *Agathis robusta*, Queensland Kauri to Wild Plums and Fiddlewood's which would be recommended for removal irrespective of the proposed development.

6.3 The site's most arboriculturally significant trees have been seen as essential for retention and the proposed construction set back to allow for this. The most significant trees theoretically affected by the works include the mature *Ficus microcarpa var. Hillii*, or Hills Weeping Fig trees documented as Trees 1 and 2.

6.4 Tree 1 is a fully mature example of this exotic Ficus species. This tree has grown to over 20m with a similar canopy spread. This is supported on a co dominant trunk with the larger leader 1.4m in diameter and the sub dominant leader approximately 90cm wide. This union is included and the sub dominant leader partially girdled by the surface root development of the main leader. The inclusion is a significant structural issue that will lead to this leader becoming increasingly prone to failure, particularly as the tree reaches over maturity and the lever force increases. High Value. Retain.

6.5 Tree 2 is another well established *Ficus microcarpa, var. Hillii* located adjacent to The College's Cranbrook Road boundary. This tree has reached a height of over 20m and is supported on a well structured single leader until approximately 1.6m above ground level where it forks. The tree has been partially suppressed by a neighbouring Pine tree that has recently been removed due to significant trunk and basal decay. This has resulted in the development of a pronounced lean to the east and over the adjacent Macintyre House residence. High Value. Retain.

6.6 Tree 3 is a well established *Eucalyptus robusta*, or Swamp mahogany located on the front verge. This tree has grown to a height of over 18m and is supported on a trunk of over 40cm. Canopy development has however been forced to the west and over Cranbrook Road due to partial canopy suppression from the previously noted and removed Pine. High Value. Retain.

6.7 Tree 4 is another *E. robusta*, or Swamp Mahogany on the verge. This tree has failed to develop in this location for a range of environmental factors. Moderate Value. Retain.

6.8 Tree 5 is a well established *Lophostemon confertus*, or Brush Box on the front verge. This tree has grown to a height of approximately 18m and is supported on a single trunk of 42cm in diameter. The tree has a broad (1m) basal flare indicating that is a mature example of this important native tree species. High Value. Retain.



6.9 Tree 6 is another *E. robusta*, or Swamp mahogany located on the front verge. This is another well structured and significant tree supported on a trunk of over 68cm. High Value. Retain.

6.10 Tree 7 is a mature *Eucalyptus sideroxylon*, or Iron Bark, again located on the Cranbrook Road verge planting. This tree has grown to a height of over 18m and is supported on a trunk of over 70cm. The tree is sparsely foliated at the moment although new growth is noted throughout the tree's upper canopy. Visible surface decay was also noted at the tree's base. High Value. Retain.

6.11 Trees 8, 13 and 14 are all *Harpephyllum caffrum*, or Wild Plums. These are a South African exotic tree species with a biological potential well beyond what should be considered appropriate here. It will be assumed that these will have self seeded in these locations and removal recommendations would be made irrespective of this or any proposed development. Remove.

6.12 Tree 9 is a well established and mature *E. robusta* or Swamp Mahogany located on the eastern side of Macintyre House. This is a well structured and healthy example of the species located well outside the CIZ of the proposed development. High Value. Retain.

6.13 Tree 10 is a semi mature *Eucalyptus scoparia*, or Scribbly Gum located on the eastern side of Cranbrook Lane. This tree has grown to a height of approximately 8m but appears to have entered a cycle of decline with die back throughout its upper canopy. Low Value. Retain.

6.14 Tree 11 is a juvenile to semi mature *Agonis flexuosa*, or Western Australian Peppermint located within the southern edge of the garden bed that forms part of the College's Cranbrook Lane boundary. This tree has grown to a height of less than 8m and is supported on three (3) leaders from ground level. These are all partially included, affecting structural integrity and arboricultural value. Moderate Value. Remove.

6.15 Tree 12 is a juvenile *Lophostemon confertus,* or Brush Box, again located within the southern portion of the above mentioned planter. This tree has grown to a height of under 10m and is supported on a co dominant trunk from just above ground level. Part of more recent planting works. Moderate Value. Remove.

6.16 Tree 15 is a semi mature *Citharexylum* or Fiddlewood tree. This tree has grown to a height 12m and is supported on three (3) leaders from ground level. This has resulted in the formation of a relatively broad canopy relative to the species. Low Value. Remove.

6.17 Tree 16 comprises a stand of eight (8) smaller Fiddlewood trees that have been planted within 40cm of the site's eastern boundary wall. These have all grown to approximately 7m in height and are supported on multiple trunks of between 10 and 20cm in diameter. All have been considered as Low Value due to species characteristics and recommended for removal due to their location in relation to the boundary wall. Remove.

6.18 Tree 17 is a semi mature *Casuarina glauca*, or She Oak. This is a native tree species that remains a small fraction of its full biological potential. The tree is part of more recent plantings and has not been considered as a material constrain to the proposed development. Moderate Value. Remove.

6.19 Trees 18 and 20 are both remnant *Agathis robusta,* or Queensland Kauri trees. These have been considered as essential for retention and all works have been set back to ensure their preservation. High Value. Retain.



**Retention Value 1 Retention Value 2 Retention Value 3 Retention Value 4 High-Essential** Moderate Low Remove Retain Retain Retain Remove Retain Remove Remove Remove 1.2.9. 3, 4, 5, 6, 11.12. 10 8.13.14. 18, 19, 17 7 15.16 20 Total: 6 Total: 0 Total: 5 Total: 3 Total: 1 Total: 5 Total: 0 Total: 0

6.20 The final tree documented is a mature and remnant *Ficus rubiginosa*, or Port Jackson Fig. This is another tree that has been considered as essential for retention and all works set back. High Value. Retain.

# 7. DISCUSSION

7.1 The proposed works will not require the removal of any of the High Value trees documented. Removal recommendations have been made for Trees 11,12 and 17. These are part of the more recently planted native species adjacent to the site's Cranbrook Lane boundary. The remainder of the trees documented for removal are all Low Value and would be recommended for removal irrespective of the proposed development.

7.2 The proposed works required to allow for the construction of the stairway and for the excavation of the site's western edge will affect approximately 15.2% of Tree 1 theoretical TPZ and 5.4% of that of Tree 2. Australian Standards for the Protection of Trees on Development Sites references incursions of greater than 10% as significant. This will require consideration throughout the construction process.

7.2 As previously noted, Tree 1 has developed with a co dominant and included leader. The sub dominant leader is a partially suppressed, horizontal limb that is over 90cm in diameter and sits over a High use Target Zone. The tree is a fully mature example of this species that will soon become over mature and enter into a cycle of decline. This will lead to less cambium flows and a more brittle wood structure. The suppressed nature of this sub dominant leader and its poor basal structure will increase this limbs probability of failure.

7.3 Management options to address this limb are limited given the weights and mass involved, with slings and D shackles rated to less than 3Tonne. Immovable infrastructure and access paths similarly affect Target ratings.

7.4 As noted and detailed, the proposed works will require excavation within the theoretical TPZ of both Trees 1 and 2. No incursion into either tree's Structural Root Zone (SRZ) and the structural integrity of both trees will be preserved. These incursion will however affect these tree's ability to absorb both soil moisture and nutrients from the surrounding soil profile to varying degrees. The species is well know for its vigorous nature and ability to adapt to a broad range of environmental conditions as well as the impacts of construction. These works are well within their range of tolerance and both trees will be able of compartmentalise the smaller diameter root pruning required.

7.5 Although not required to allow the proposed development to occur it will be recommended that relatively significant pruning works occur to both Trees 1 and 2. It will be recommended that the lower sub dominant leader be removed for Tree 1 and the lower eastern limbs from Tree 2 be removed. The removal of the large diameter leader from Tree 1 will eliminate the



significant hazards associated with its retention and ensure equilibrium between root mass and canopy following construction incursion.

7.5 The suppressed development of Tree 2 has resulted in the formation of a canopy that extends predominantly to the east and over the historic Macintyre House. This is affecting building lines and solar access and would be remedied with the removal of the lower canopy limbs as detailed. This will again also ensure equilibrium with the tree's root system following excavation.

# 8. Tree Protection Plan

8.1 This report will recommend the retention of Trees 1, 2, 3, 4, 5, 6, 7, 9, 10, 17, 18, 19 and 20. These will be retained via the implementation of the following list of recommendations. These have been based on our national standard for the *Protection of Trees on Development Sites AS4970.* 

*8.2* Removal recommendations have been made for the following trees based their location in relation to the construction. Additional removal recommendations have been made based on poor species characteristics and structure. These include Trees 8, 11, 12, 13, 14, 15 and 16.

8.3 All construction works should be done from within the construction impact zone to limit the indirect impacts of the development process. No works are to be undertaken outside those detailed here. All Tree Protection Zones will be fenced off, marked as a Tree Protection Zone (TPZ) and mulched in accordance with the following conditions.

8.4 Any roots located in the excavation process will be cut cleanly at the edge of the proposed construction to limit the spread of decay and their exposure to the air and atmosphere.

8.5 All trees documented for preservation will be preserved with the implementation of the following list of *Tree Preservation Recommendations*. These have been based on our *National Standard for the Protection of Trees on Development Sites AS4970* and should be implemented during the construction process, where applicable.

#### 1.0 Appointment of Site Arborist

A site arborist shall be appointed prior to the commencement of work on site. The Site Arborist shall clearly mark out all trees to be removed and ensure that all trees documented for retention are preserved with the implementation of the following tree protection measures. The Site Arborist shall have a minimum qualification equivalent to a NSW TAFE Certificate Level 5 or above in Arboriculture.

#### 1.1 Inspection Points

Give 5 working days notice to allow inspections to be undertaken at the following stages;

Inspection Point	Inspection Personnel
Installation of Tree Protection Zones including Tree Protection Fencing, Silt Fencing and Signage	Site Arborist

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Inspection Point	Inspection Personnel
Modification of the Tree Protection Zone	Site Arborist
Works within the Tree Protection Zone	Site Arborist
Completion of Construction Works	Site Arborist Site Supervisor.

#### 1.2 Education

Contractors and site workers shall receive a copy of these specifications prior to the commencement of work. Contractors and site workers undertaking any works within a TPZ shall sign the site log to confirm that they have read and understand these specifications prior to their undertaking.

#### 1.3 Tree Protection Zones

Where applicable, all trees to be retained through the construction process shall be protected from mechanical damage and the indirect impacts of the construction process with the installation of Tree Protection Zones. Unless otherwise stated, the following activities must not be carried out within a TPZ;

- modification of existing soil levels
- excavation or trenching
- cultivation of soil
- mechanical removal of vegetation
- movement of natural rock
- storage of materials, plant or equipment
- erection of site sheds
- affixing signage or hoarding to trees
- disposal of chemical waste or construction material
- any activity that may directly or indirectly affect the health of these or surrounding trees.

Note: If access to a TPZ is required as part of the approved development, prior authorisation is required by the Site Arborist.

#### 1.4 Tree Protection Fencing

Tree Protection Fencing shall be installed at the perimeter of the TPZ. As a minimum the Tree Protection Fencing shall be 1.8 meters high temporary chain supported by steel stakes. This shall be fastened and supported to prevent sideways movement. The trees woody roots shall not be damaged during the installation of this Tree Protection Fencing. This Tree Protection Fencing shall be erected prior to the commencement of works on site and shall be maintained for the duration of the construction process.

#### 1.5 Signage

Tree Protection Signage shall be attached the PTZ and displayed in a prominent location. These signs shall be repeated in 10m intervals or closer where the fence changes direction. These shall be a minimum of a 72 font size and each sign at-least 600 x 500mm.

#### 1.6 Mulching



The area within the TPZ shall be mulched and maintained with 80mm of leaf litter mulch for the duration of the construction process. This mulch shall be spread by hand to limit the impact on underlying roots and shall be installed prior to the commencement of works on site.

The Site Arborist shall inspect and approve the TPZ including mulching. signage, Tree ProtectionFencing, Silt fencing and Signage prior to the commencement of works on site.

#### 1.7 Site Management

Materials and waste storage, site sheds and temporary services shall not be located within the TPZ unless specified. Storage points shall be covered when not in use and be no greater than 2m in height.

#### 1.8 Works within the TPZ

The TPZ may need to be modified during the works to allow access between the protected tree and the proposed construction. The TPZ shall remain as specified and only those works detailed in the proposed construction undertaken.

#### 1.9 Completion of Works within specified TPZ

Upon the completion of works within a TPZ the protective fencing shall be reinstated as specified. Where the construction of new structures does not allow for the reinstallation of fencing the TPZ shall be modified by the Site Arborist.

George Palmer Diploma Horticulture- Arboriculture (Level 5) Associate Diploma Horticulture- Landscape.

Disclaimer

All care has been taken to assess potential hazards, but trees are inherently dangerous. This assessment was carried out from the ground, and covers what was reasonable to be assessed at the time of inspection. No aerial or underground inspections were carried suability is accepted for damage or injury caused by trees and no responsibility is accept if the recommendations in this report are not adhered to. Limitations on the use of this report. This report is to be utilised in its entirety only. Any written or verbal submission that includes statements taken from this report may only be used where the whole report is referenced. Assumptions care has been taken to obtain accurate information from reliable sources. Botanics can neither guarantee nor be responsible for the accuracy of information provided by others.



Figure 1 Shows the sub dominant leader of Tree 1.



Figure 2 Shows the incursion and girdling detailed.

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Figure 3 Shows the lower canopy suppressed development of Tree 2 and the impact on Macintyre House.



Figure 4 Shows Trees 11 and 12 required for removal.





Figure 5 Shows the theoretical impacts of the construction on both Trees 1 and 2.



Figure 6 Shows the locations of the documented trees in relation to the proposed development.





Figure 7 Shows the longest trench and the limited volume f roots uncovered.



**Figure 8** Shows the roots exposed in the shorter trench. All under 80mm in diameter and in the top 300mm of the soil profile.

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19th March, 2020.

# 9. ANNEX - Root Mapping And Construction Impacts.

9.1 This Annex has been requested to enable a visual assessment of the roots affected by the proposed development. This has seen non destructive root investigation expose those roots located within the proposed construction footprint.

9.2 This assessment was done with Woollahra Council's Tree Preservation Officer- Simone Woodman, Site Architect- David Fleeting, as well as Scots College's Steven Adams. Site photographs were done previously and outline the locations of those roots.

9.3 As correctly predicted the root spread and development has been significantly affected by existing infrastructure. The longest trench adjacent to the tennis court had fewer than eight (8) larger diameter woody roots. The central concrete path appears to have involved the excavation and removal of some roots. This may have been done as part of infrastructure works between Macintyre House and the rest of the College.

9.4 The second shorter trench was excavated approximately 8m from the base of Tree 1. This is outside the tree's SRZ of both Trees 1 and 2. This will not affect the structural integrity of either tree. Multiple roots of less than 40 - 80mm in diameter were located in this trench and will be required for removal to allow the construction to occur.

9.5 Incursions within theoretical TPZ areas are documented in **Figure 5.** These show significantly greater incursions than will be affecting these trees. Site topography and previous construction has affected the abiotic spread and development of both of these tree's root systems.

9.6 As previously noted, these trees are likely to have fused their root systems and will form a single network. This will enable both trees to draw from a common and broad network of feeder and structural roots that will be predominantly located to the south and under the embankment under Cranbrook Road.

9.7 While both trees are mature and well established, both remain a small fraction of their full biological potential and will continue to grow towards full maturity in time. As noted, this will enable them to compartmentalise any smaller diameter root pruning wounds and to produce compensatory roots to replace those required for removal.