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Graythwaite, Union Street, North Sydney

Section 75W Modification
Concept Approval No. MP10_0149 and
Stage 1 Project Approval No. MP10_0150

Proposed minor modifications

Statement of Heritage Impact

Prepared for
SYDNEY CHURCH OF ENGLAND GRAMMAR SCHOOL

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Project number 09 0821

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CONTENTS

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1 INTRODUCTION

1.1 Background and purpose of the report

This Statement of Heritage Impact (SoHI) has been prepared on behalf of the Sydney Church of England Grammar School (Shore School) to accompany a Section 75W modification to the Concept Approval MP10_0149 and Project Approval MP10_0150 for Graythwaite, North Sydney. It aims to identify and assess the potential heritage impacts associated with the proposed minor modifications to the approved new landscape works and other minor works to the site, including:

Concept Approval MP10_0149

Staging
Moving the following works from Stage 2 to Stage 1:

- Demolition of the Ward Building;
- Construction of the driveway link between the Graythwaite and Shore sites.

Tree removal
Removal of the following two trees located in the vicinity of the Ward Building

- T60 a Small-leaf Fig (and replacement)
- T51 a Washington Palm

Project Approval MP10_0150

Staging
Moving the following works from Stage 2 to Stage 1:

- Demolition of the Ward Building;
- Construction of the driveway link between the Graythwaite and Shore sites.

Landscaping and tree removal

- Landscaping of the former Ward Building footprint;
- Removal of tree T60 a small-leaf Fig (and replacement) and tree T51 a Washington Palm, both located in the vicinity of the Ward Building.

Other minor modifications

- Removal of a non-original brick internal wall in the Stables Musuem;
- Modification of the approved timber paling fence along the north-west site boundary to a steel paling fence

Heritage significance

Graythwaite is a place of exceptional heritage significance. Originally known as Euroka, the site comprises expansive gardens which provide a landscaped setting for the nineteenth century house and its outbuildings. The two-storey sandstone house is a distinctive and imposing example of a grand nineteenth century residence, while the c1830s Stables Building may be the oldest remaining building of its type in the area. The scale of the House complex, the mature landscaping and size of the property demonstrate the wealth and aspirations of its owners during the boom period of the late nineteenth century. It has exceptional cultural significance also through its historic association with the Australian Red Cross Society through its conversion to a convalescent home during the First World War.

Background

A Conservation Management Plan (CMP) for the Graythwaite site was prepared in November 2010 and endorsed by the Heritage Council of NSW in June 2011.

Purchased by the Shore School in 2009, an initial Concept Plan and Stage 1 Project Application for the Graythwaite site was submitted to the Minister for Planning pursuant to Part 3A of the *Environmental Planning and Assessment Act 1979* in December 2010. The Stage 1 Project Application (MP10_0150) was granted approval in November 2012.

Authorship

This SoHI has been prepared by Sarah-Jane Zammit, Heritage Specialist, and reviewed by George Phillips, Director, both of Tanner Kibble Denton Architects.

1.2 Site location and description

Graythwaite is located on 2.678 hectares within the local government area of North Sydney. The property is bound on the east and north by the Shore School, on the south by Union Street and private residential properties fronting Union Street, and on the west by private residential properties fronting Bank Street (Figure 1). To the rear of the site is Edward Street, which is the current street address and entry, although Union Street was used as the primary street address and entry throughout the nineteenth and the greater part of the twentieth centuries.

The site slopes steeply upwards to the north-east and features a number of open grassed areas and landscaped embankments. The buildings are located on the upper terrace in the north-east corner of the site and include the House Complex (Graythwaite House, Kitchen Wing, Stables Building and West Annex), the Ward Building to the east of the complex (to be demolished as part of Stage 1 works), the Tom O'Neill Centre to the west of the complex, and the Coach House abutting the north boundary.

The cultural landscape is characterised by informal avenue planting along the Union Street entry driveway and prominent stands of mature trees including large Moreton Bay figs along the terraced embankments, west and south boundaries, interspersed with more recent tropical plantings. Areas to the front (south) and rear (north) of the House Complex are asphalted.

Figure 1 Aerial photograph of the immediate context of the Graythwaite site, not to scale.
Source: www.nearmap.com with Tanner Architects overlay 2011

1.3 Documentation

This SoHI has been prepared to accompany a Section 75W application. It should be read in conjunction with the following:

- Environmental Assessment Report, prepared in September 2013 by Robinson Urban Planning Pty Ltd;
- Graythwaite, Union Street, North Sydney – Conservation Management Plan, prepared by Tanner Architects in December 2010 and endorsed by the Heritage Council of New South Wales in June 2011;
- Graythwaite, 20 Edward Street, North Sydney – Revised Concept Plan and Stage 1 Project Application, Statement of Heritage Impact, prepared by Tanner Architects in September 2011; and
- Tree Report, prepared June 2011 by Mark Hartley of The Arborist Network.

The proposed modifications to the approved Part 3A Stage 1 Project Application Works are detailed in the following drawings:

Architectural – Stage 1 Project Application – Tanner Architects

- AR.DA.0001 (issue E) – Cover and Location Plan
- AR.DA.0002 (issue E) – Site
- AR.DA.0003 (issue D) – Graythwaite House Ground and First Floor Demolition Plans
- AR.DA.1001 (issue D) – Graythwaite House Proposed Basement and Ground Floor Plans
- AR.DA.1002 (issue D) – Graythwaite House Proposed First and Attic Floor Plans
- AR.DA.2002 (issue D) – Graythwaite House Proposed Sections

Architectural – Concept Plan – PD Mayoh Architects

- A.000 (issue J) – Cover Page and Staging Diagram

Landscape – Taylor Brammer

- LT.000 (issue F) – Title Sheet
- LT.001 (issue G) – Landscape Master Plan
- LT.002 (issue G) – Landscape Plan - North
- LT.003 (Issue I) – Tree Removal and Retention Plan
- LT.004 (Issue E) – Existing Tree Schedule – Heritage Significance & Action
- LT.006 (Issue E) – Landscape Soft Works
- LT.007 (Issue E) – Landscape Tree Plan
- LT.008 (issue E) – Landscape Lighting Plan

2 HERITAGE SIGNIFICANCE

2.1 Introduction

The following is a Summary Statement of Significance for the Graythwaite site. It has been extracted from the 2010 CMP which was endorsed by the Heritage Council of NSW in June 2011. For further historical background and analysis of the significance of the buildings and site refer to *Graythwaite, Union Street, North Sydney – Conservation Management Plan 2010* and/or *Graythwaite, 20 Edward Street, North Sydney – Revised Concept Plan and Stage 1 Project Application, Statement of Heritage Impact, September 2011*.

2.2 Summary Statement of Significance

Graythwaite is a place of state and local significance, included on Schedule 3 of the North Sydney LEP, the schedule also lists the interiors of Graythwaite as items of significance. The SHR listing for the Graythwaite site includes a Statement of Significance for the site, which was prepared in 2000. The CMP includes an updated significance assessment and Summary Statement of Significance. This statement is repeated below:

> *Graythwaite is a place of outstanding cultural significance to the State for its historic associations with the Dibbs family and the regime of care undertaken by the Australian Red Cross Society of invalided solders of the First World War.*
>
> *The House at Graythwaite and its garden setting demonstrates both the late nineteenth century aesthetic and lifestyle values of Sir Thomas and Sir George Dibbs and the outlook of society in the 1910s in regard to the appropriate setting for convalescence and medical care.*
>
> *The gifting of Graythwaite to the State by Sir Thomas Dibbs in 1915, as a result of the high human cost of the Gallipoli campaign, undoubtedly reflects broader community concerns about the consequences of the nation's engagement in the First World War. Similarly, the drive of the local branches of the Australian Red Cross Society to fund and maintain over decades a property on the scale of Graythwaite demonstrates inter-war community concern about the long-term welfare of the returned invalided combatants.*
>
> *Graythwaite is a place of outstanding cultural significance to the local community for its historic associations with an estate that was initially established by Deputy Commissary General Thomas Walker from 1833 as Euroka and developed into the form seen today by Edwin Sayers in the 1850s and George Dibbs in the 1870s. The layers of development of both the House and its garden setting provide the contemporary local community with a focus for understanding the history of the area.*

3 DESCRIPTION OF THE PROPOSAL

3.1 General

The proposed modifications to the approved design for Graythwaite are:

Demolition

- The demolition of the Ward Building to be brought forward in date from Stage 2 to Stage 1;
- Removal of a non-original brick internal wall in the Stables Museum.

Landscape works

- Landscaping works to the site of the Ward Building at the interface across the boundary to the east, to the adjacent Shore Senior School site;
- Activation of the approved vehicular link from Graythwaite to the Senior School site on the eastern boundary, to be brought forward from Stage 2 to Stage 1;
- Modification of the approved timber paling fence along the north-west site boundary to a steel paling fence;
- The removal and replacement of a structurally unstable tree, a *Port Jackson Fig* tree (tree T60). The tree was assessed in 2010 by the arborist as being structurally unsound, and the required decontamination works in the vicinity of the tree will necessarily result in a detrimental impact on its health.
- The removal of a *Washington Palm* tree (tree T51) in front of the south elevation of the Ward Building.

Works to buildings

- Removal and replacement of an external door to the loft of the former Stables Building.

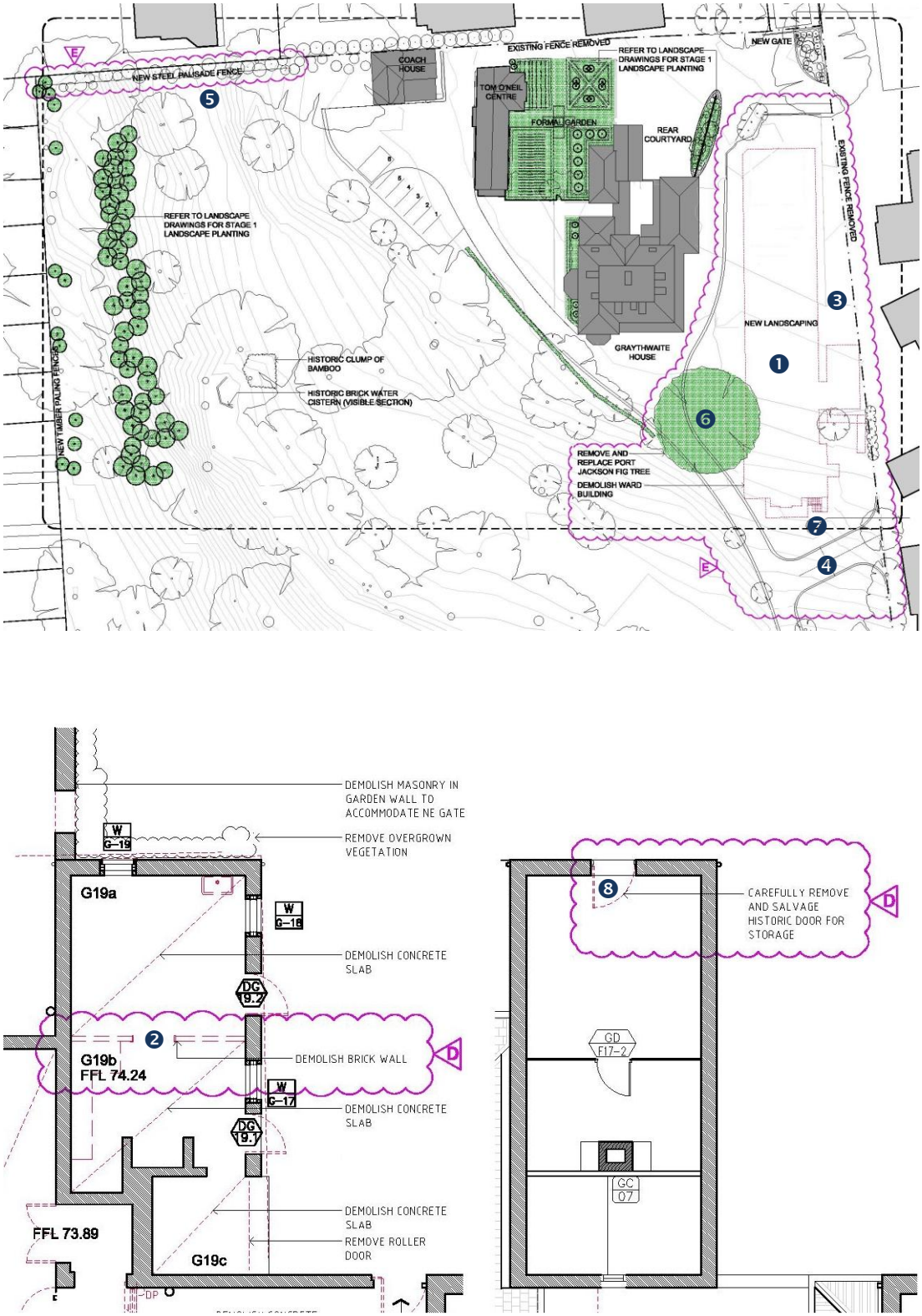

Figure 2 Landscape plan, ground and loft plan for Stables Building highlighting proposed locations of proposed modifications.
Source: TKDA, 2013.

4 ASSESSMENT OF HERITAGE IMPACT

4.1 Introduction

The assessment of the potential heritage impacts associated with the proposed modifications and alterations to the approved Part 3A Stage 1 Works Application have been undertaken with regard to the NSW Heritage Office guidelines – *'Statements of Heritage Impacts'* and the relevant conservation policies contained in the *Graythwaite Conservation Management Plan* prepared by Tanner Architects in 2011. Where relevant, the proposed works have also been assessed with reference to the *North Sydney Local Environment Plan 2001* (LEP) and the *North Sydney Development Control Plan 2002* (DCP).

4.2 Demolition of the Ward Building

The demolition of the Ward Building is proposed to be completed in Stage 1, earlier than the approved time frame for Stage 2. Demolition of the Ward Building is proposed to enhance the setting of Graythwaite House and its environs for the interim, prior to the construction of the approved East Building.

The heritage impact of the amended staging for demolition of the Ward Building is neutral. From an aesthetic perspective, the enhanced landscaped setting of Graythwaite House is a positive aspect of the proposal.

Figure 3 The Ward Building as see from the driveway.
Source: TKDA, 2010.

4.3 Demolition of the brick wall in the Stables Museum

The proposed demolition of the brick wall in the Stables Building is proposed in order to create one large room, in place of the existing two room configuration (see Figure 4). Previously thought to be of early (but not original) construction, physical investigation of the wall has confirmed that it is of 20th century provenance. It is constructed on top of the earlier sandstone flagged floor, and the bricks themselves are of modern origin. The heritage significance of the wall is limited insofar as it demonstrates a later phase of alteration and functioning of the building.

Figure 4 The existing wall between rooms G19a and G19b proposed to be removed.
Source: TKD Architects, 2013

The demolition will assist the building's viability as a functional museum, allowing for increased access to the spaces by students and visitors. Whilst the wall is not original and therefore its removal will not be a loss of significant fabric, its removal will have a minor impact on the interpretive understanding of a later alteration to the building. This minor impact is balanced against the substantial advantage of the creation of a clear open space which will aid in the usability of the space's proposed function as a museum.

4.4 Landscape works

Landscaping to the site of the Ward Building

On the demolition of the Ward Building, it is proposed to undertake minor landscape works to the site at the interface at the boundary to the east, adjacent to the Shore Senior School site.

The proposed works are minor in nature and will aid in the connectivity of the Shore Senior School to the Graythwaite site, as well as enhancing the setting of Graythwaite House in the interim period prior to the construction of the approved East Building. Connectivity of the site will provide a positive benefit for school staff and students, and therefore these minor modifications are considered to have a neutral impact to the significance of the site.

North-west site boundary fencing

The approved design for the boundary fencing in the north-west part of the sign is a timber paling fencing. To improve the visual amenity of the Headmaster's Residence which borders this part of the Graythwaite site, a steel palisade fence is now proposed.

The heritage impact of this minor modification on the significance of the Graythwaite site is neutral.

Figure 5 The Headmaster's house as viewed from within the Graythwaite property.
Source: TKDA, 2010

Tree removal

A large *Port Jackson Fig* tree (tree number T60) at the upper section of the driveway is proposed to be removed and replaced with a tree of the same species. T60 has been determined by the arborist as structurally weak (refer to the 2011 tree report in Appendix A and the subsequent 2013 addendum in Appendix B); with the presence of an increasing probability of structural failure of several branches at their point of attachment to the tree. This increased risk of failure results in an approximate 1:180 000 risk of serious harm or death should these branches fall. Whilst the health of the tree is considered good, the useful life expectancy of the tree has been determined as transient, at no longer than 5 years, with a low retention value.

The tree is located in an area which requires decontamination; ground in which the remediation engineer has recommended excavation of between 250mm and 500mm depth within the Tree Protection Zone for T60. Excavation methods, in particular when undertaken mechanically, have been determined as likely to damage significant sections of the woody and fine tree root system, leading to a significant and detrimental impact on the health of the tree.

This tree has been assessed in the Conservation Management Plan (2011) as being of high significance. As a significant part of the original planting of Graythwaite, the removal of the tree unavoidably results in a negative heritage impact on the landscape at Graythwaite. Accepting the need to remove the tree owing to the required remediation works, its structural weakness and limited life expectancy, the negative heritage impact is proposed to be mitigated through the propagation of a new tree from T60, and replanted in the same location once decontamination of the ground has been completed.

Additionally, a *Washington Palm* tree (tree number T51) located in front of the Ward Building is also proposed to be removed. Whilst the tree has been determined by the arborist as structurally sound, it has been listed as of little heritage significance in the 2011 CMP. Likely to be planted c1970s, the tree does not contribute to the understanding of the historical cultural landscape of the Graythwaite site. Its removal is therefore not considered to have a negative heritage impact (refer to Appendix B).

Figure 6 T60 *Port Jackson Fig* tree, located at the top of the driveway adjacent the Ward Building.
Source: TKDA, 2010

Figure 7 T51 *Washington Palm* tree, located in front of the Ward Building.
Source: TKDA, 2010

4.5 Works to buildings

Stables Building mechanical services

It is proposed to relocate a required air intake vent from the west roof slope of the Stables Building to a wall vent within the north gable end. The air intake vent comprises part of the mechanical services for the building, required for its adaptation to a museum. The wall vent is proposed to be incorporated within the loft door in the north gable end. This change is proposed in order to improve the external appearance of the building by avoiding the visual impact of modern services.

The present loft door is glazed and timber panelled and is presumed to be either original to the construction of the building or late nineteenth century (Figure 8 and Figure 9). To avoid any negative impacts associated with modification of the historic door to incorporate a mechanical services vent, it is proposed to carefully remove the door and frame and safely store it within the loft. The door would be replaced with a simple timber door incorporating an air intake vent in its fanlight.

Overall, it is considered that the relocation of the air intake vent from the roof to the north gable end will have minimal heritage impact, improving the overall appearance of the building, whilst protecting historic fabric through the removal and storage of the door.

Figure 8 Internal view of the Stable Building loft door.
Source: TKDA, 2011.

Figure 9 North elevation of Stables Building showing loft door.
Source: TKDA, 2013.

5 CONCLUSION

The minor modifications to the Part 3A Stage 1 and Concept Approvals for Graythwaite are proposed for the enhancement of the site and landscape and better functioning and presentation of the Stables Building.

In the case of the removal and replacement of the *Port Jackson Fig* tree (tree T60), its removal is proposed to address its unstable condition and to allow for the safe decontamination of the surrounding ground. The historic nature of the tree's location and species will be interpreted in a replacement tree of the same species in the location. The proposed removal of the *Washington Palm* tree (tree T51) is not considered to have a negative heritage impact; instead its removal will aid in the understanding of the historic cultural landscape of the Graythwaite site.

Demolition of the Ward Building during the present Stage 1 works, approved as part of the Stage 2 works, will provide an enhanced setting for Graythwaite within its immediate environs.

Proposed works to the Stables Building are proposed to improve its external appearance - through the relocation of a mechanical services vent - and improve its internal functioning - through the removal of the non-original internal wall. The proposed removal of the dividing wall will provide a substantial advantage, creating a clear open space, a positive outcome for the continued functioning of the building.

There are no negative heritage impacts arising from the proposed change to the northern boundary fence to a steel palisade fence.

Considered overall, the proposed minor additional and modified works, including the proposed earlier demolition of the Ward Building in Stage 1, will not result in any additional adverse impacts on the heritage significance of the Graythwaite site and buildings, and would result in only negligible or minimal impacts on the contribution of the items to the overall significance of the site, while delivering benefits to the sites future and continued use.

APPENDIX A TREE REPORT

Tree Report

Site Address: Graythwaite Shore School
Edward Street
North SydneyNSW2060

Prepared For: Mrs Dixon.

Prepared On: **22nd June 2011**

Report Number: **CD1050**

Prepared By: **Mark Hartley**
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Table of Contents

Brief

I have been asked to

Visit the site
Inspect a *Ficus rubiginosa* (Port Jackson Fig) Tree 60
Perform a **V**isual **T**ree **A**ssessment (**VTA**)[1]
Based on the initial testing perform a series of Resistograph tests
Provide an interpretation of the Resistograph test results
Apply that interpretation to a Quantitative Tree Risk Assessment
Produce a report on the tree for use by decision makers

Background

The tree is a *Ficus rubiginosa* (Port Jackson Fig) identified as Tree 60 in a "Tree Health and Condition Assessment Schedule" prepared by Earthscape Horticultural Services. In that document the author describes the tree as "Appears stable with poor branching structure. Multiple large wounds with evidence of decay. Very large cavity in lower trunk." The document notes that the tree has been "selectively pruned", indicates that it is in "good vigour" and records "no evidence" of pest and diseases. The document also provides a SULE rating of "Transient (less than 5 years)"

Concerns have been raised about the potential risk associated with retaining this tree in particular as the area starts being used as an educational facility.

Method

A site inspection was performed on the 10th June 2011. The site observations contained in this report were made during the site inspection. Because identification is not critical to the issues of concern, identification was made based on cursory observations at the time of the inspection and not on a full taxonomical assessment of the specimen.

The inspection of the tree was carried out from the ground using a Visual Tree Assessment. Based on that inspection sounding of a number of stems was performed using a Thor hammer. Based on observations from the Visual Tree Assessment and form sounding with the hammer 5 Resistograph tests were performed using a Resi400 Resistograph. The cavity area was opened by removing some of the external redundant tissue enabling deeper testing in the area of the cavity.

Photographs were taken of the tree and in particular, the location of the test points and are contained in appendix 3.

[1] **VTA** – Visual Tree Assessment is a systematic inspection of a tree for indicators of structural defects that may pose a risk of failure. This is made from ground level, unless otherwise stated. Dr Clause Mattheck describes the method in *The Body Language of Trees.* It is the recognised assessment process and is supported by the International Society of Arboriculture as the standard visual assessment process. Invasive and other diagnostic fault detection procedures will generally only be recommended when visual indicators of potential concern are observed.

The "Tree Health and Condition Assessment Schedule" prepared by Earthscape Horticultural Services was considered and the location of the tree was confirmed against a plan that was provided. Both documents can be found in appendix 4

Observations

General observations

The tree has a tag "T26" on the south western side of the trunk, approximately 2 metres above ground level. The tree appears to be in good health, there are no significant pest issues. At the base of the tree, the circumference is over 6 metres. There are a large number of basal suckers that have recently been cut to leave numerous stubs.

There are a large number of aerial roots that have grown over the old trunk, that now provide additional structural support to the tree. Aerial roots are also present on a number of the larger branches. The tree appears to have originally had four or five stems but these have been grafted together; being covered by aerial roots that have become integral to the stems of the tree.

The tree is clearly visible in the RTA's 1943 aerial image of the site and at that time the tree had a similar canopy spread as it does today. Based on its current size and history it is most likely that this tree over 100 years old and conceivably a part of the 1870s plantings and possibly grown from a seedling that had been removed from elsewhere in the area. A small tree is present in approximately this location in the image held by the National Library of Australia dated C1878[2].

The tree appears to have been loped at some stage in the past. This lopping appears to be the cause of a number of wounds. There are a number of old cuts with the remnants of an old wound dressing still apparent. Because of this prior lopping, a number of branches coming from the main stem have somewhat irregular points of attachment.

A cavity was present on the south eastern side of the tree about 1.2 metres above ground. No other areas of significant decay could be detected either by visual observation or by sounding of the trunk.

Test results

The test results are contained in appendix 2. The sections shown in yellow on the graphs are area of decay. The sections shown in pink are areas of early strength loss associated with decay. The remaining sections of the graphs show the wood has not been altered to any significant extent by decay.

The Resistograph results confirmed the VTA and sounding observations. With the exception of the decay present around the cavity there is no other significant decay that is likely to impact on the stability of the tree.

[2] http://acms.sl.nsw.gov.au/item/itemLarge.aspx?itemID=412838

Graphs four and five show that there is a column of decay in the south eastern portion of the trunk. An examination of canopy above this wound revealed that there was not a significant load from branches on this portion of the tree. In fact, it would appear that this portion of the tree might have declined significantly after the lopping resulting in the reduced growth and the increased deterioration of the wood.

Discussion

Tree identity

There was some confusion as to the identity of the tree. The genus is unquestionably Ficus and the difference between *Ficus obliqua* and *Ficus rubiginosa* is quite difficult to discern, so much so that fairly recently one of the three subspecies of *Ficus obliqua* has been reclassified as *Ficus rubiginosa* and another cultivar reclassified as a new species. Whichever of the two species it may be the precise answer does not influence the issue at hand and that is the retention or removal of this tree.

Past treatment

The primary problem associated with this tree is the impact of prior lopping of the tree. The ACTS Tree Wound Dressing was commonly used in the 1980's but this would not have been used on cuts when they were lopped, rather this would have been used on a treatment after the tree was lopped. Based on the current canopy spread and the performance of similar trees to lopping I would suggest that the lopping took place sometime in the 1960's or 70's.

The lopping has given rise to two significant problems. The first problem is the death of trunk tissue, and the exposure of that dead tissue to decay and the second problem is the poor branch attachments that formed around the cuts after the tree had been lopped.

The presence of decay

Decay is only a problem for the tree if it affects the structural stability of the tree. Various models consider the impact of decay on strength loss. These include models by Mattheck who demonstrates a hollow of 705 of the radius still has adequate strength and Wessolley who shows that depending on canopy geometry and wood properties the decay can be as high as 90% or more without significantly affecting the stability of the tree.

These models generally consider a single roughly cylindrical stem, which is clearly not applicable in this instance. However, these models demonstrate that the growth pattern of trees results in greater strength that trees generally require for stability.

Behaviour of Figs to decay

Figs have very deep layers of actively functioning parenchyma within the xylem. This living tissue allows the tree to respond rapidly to injury. In addition, figs compartmentalise exceptionally well. As a result, wounds do not often have problems with decay.

In this instance, it is important to consider several important properties of figs in general and from this group of figs that can behave as strangler figs. Fig branches have enormous tensile

strength and a high degree of flexibility. The high tensile strength accounts for their often very wide canopies and allows for the flexibility required to absorb wind forces in the branch tissue.

As already mentioned, this group of figs often start life as a 'strangler fig', growing on a host surface, often another tree. When the host tree dies rots away, the fig is often left as a hollow shell. In spite of this apparent lack of support, these trees seldom fail. In this instance, what we have is the tree not only growing as a fig normally would but also behaving as a strangler fig upon the dead sections of what was the trunk of the tree at the time it was lopped 40 to 50 years ago.

On this basis, there is no reason to believe that the defect present is likely to result in a significant increase in the probability of failure of the tree. In fact, it is almost inconceivable that the main stem would fain in the next decade. There is however, an increased likelihood of branch failure occurring at or around the point of attachment near the old lopping wounds.

As has already been pointed out, the branches of this genus are highly flexible and this allows for significant amounts of energy to be absorbed by the branch itself rather than being transferred to the point of attachment. This means that whilst there is an increased risk of limb failure, this risk is not significantly increased when compared to a normal branch.

Risk of Harm

Risk = likelihood x consequence. In order to make objective decisions about risk we need to consider both the likelihood and the consequence of any particular hazard. In the terms of the risk associated with a tree, risk is the likelihood of a tree or a part of the tree failing and hitting a person or object multiplied by the consequence. The **Q**uantified **T**ree **R**isk **A**ssessment (**QTRA**)[3] system has been used in determining the Risk of Harm associated with the tree because it adopts this quantitative, probabilistic approach.

There are two potential target groups. The first target is property (primarily buildings) and whilst a several of the limbs could fail during inclement weather and cause property damage, this damage in not likely to be significant and would normally be covered by insurance. Likewise, buildings provide a high degree of protection against harm to its occupants[4]. Of greater concern is the risk of injury to students and staff.

In order to assess risk it was necessary to enquire about the potential use of this area. My office was advised that there would be about 1400 people that will have the potential to walk under the tree and for the purpose of the risk calculations; I have assumed that they will each walk under the tree once in each school day (40 weeks a year). The size of a limb that is most likely to fail in the next 12 months is 250mm in diameter.

	Target Value		Impact Potential		Probability of failure		Risk of Harm
Probability Ratio	1/22.5	X	1/8	X	1/1000	=	1/180,000

[3] For a more detailed explanation of QTRA see Appendix 1

[4] Hartley M., 2011, 'The Risk of Death inside a Building from Accidental Tree Failure', *The Bar*k, June 2011

This figure means that over the next 12 months the tree, as it currently stands and if people movements were to start immediately, has a 1 in 180,000 chance of causing serious harm or death. This is about twice the annualised risk of mortality from stairs and about ten times the risk of mortality from automobiles[5]. This level of risk is certainly much higher than many trees it is still well within the range of Risk of Harm for many every-day activities.

Retain or remove the tree

There are other reasons for removing or retaining this tree other than the problems associated with the injuries and the increased risk of harm associated with the resultant defects. The tree has some historic and cultural value and there is little question that the tree provides food and habitat to a number of organisms. In addition, there are the other normal benefits associated with tree including but not limited to shade, particulate filtration from the air, reduced storm water flow and so on.

On the other side the tree has had a history of abuse and in order to get the tree back into prime condition and to a stage that it can be easily and readily maintained, in a school context, is likely to take a considerable amount of work. The basal suckers should be correctly cut and this is likely to be an ongoing maintenance requirement for quite a number of years.

In addition, there is significant benefit in considering encouraging aerial roots to develop, including the development of several as prop roots on several of the limbs, in order to provide additional support for the tree and reduce the likelihood of limb failure.

Lastly, there is the ongoing cost associated with periodic inspections of the tree and recalculation of the risk of harm. At the current time a five yearly cycle would be appropriate but the frequency would need to increase in the event that the condition of the tree deteriorated significantly of if the use of the area under the tree was to increase significantly, or a less significant combination of the two.

Recommendations

This tree sits in a middle ground. There is not sufficient ground to recommend unequivocally the removal of the tree, yet at the same time the tree is not a perfect or ideal specimen and with the faults present, there is some validity in considering the removal of the tree. The decision to remove or retain the tree remains with the consent authority and whatever the decision the consent authority makes will not be an easy one.

If the tree is to be removed, some of the historicity of the tree could be maintained by propagating a new tree from this specimen and replanting it close to the current location.

If the tree is to be retained it is recommended that the basal suckers be correctly cut to the branch collar in accordance with the Australian Standard AS4373-2007 Pruning of Amenity Trees. The use of a battery operated irrigation system combined with drippers along with hollow tubes with an appropriate medium could be used to stimulate new roots including new prop roots under some of the branches.

[5] 2004 figures for Australia obtained from the mortality database search at www.nationmaster.com

Risk management activities including restricting the use of the lawn area under the tree and diverting pedestrian movements away from under the canopy of the tree during inclement weather (with wind gusts greater than 65km/h) would also result in a reduced Risk of Harm.

Conclusion

The tree is an old specimen, perhaps of some historic significance. The tree was lopped in the middle part of last centaury and because of that lopping the tree some large wounds and some problematic branch attachments.

The region of decay in one of the old trunks will not result in whole failure of the tree. There is an increased probability of failure of several branches at their point of attachment near the old cuts but the increase in probability is not particularly significant.

If the school were to commence functioning immediately the Risk of Harm from the tree was estimated, using the QTRA system, to be approximately 1 in 180,000. Whilst this is higher than a normal fig in the same situation, it is still a smaller Risk of Harm than posed by some other activities that are considered acceptable, such as being in or near motor vehicles, because of the benefit they provide.

It is unlikely that the Risk of Harm alone would be sufficient to merit the removal of the tree but when this is combined with the ongoing problems and effort associated with maintaining such tree it may be reasonable for a consent authority to approve its removal.

If a decision is made to retain the tree, or consent to remove the tree is not granted, then it is recommended that a maintenance program be implemented as soon as possible. It is recommended that the tree be reinspected on a 5 yearly cycle to monitor the progress of the tree and to reassess the Risk of Harm associated with the trees ongoing performance. In addition, several suggestions have been provided to reduce the Risk of Harm by managing activities under the canopy of the tree.

Should you require any further information, do not hesitate to call our office for assistance.

Mark Hartley
Dip Hort (Arboriculture) with Distinction
Dip Horticulture
LMAA; LMISA; LMIPS
ISA Certified Arborist WC-0624
AA Registered Consulting Arborist # 6222-01

Appendix 1

The Quantified Tree Risk Assessment System

A New Approach to Tree Safety Management

Historically, the arborist has been relied upon to make judgments about the safety of trees. The tree owner or manager's expectation is often that the arborist will provide a definitive opinion as to whether or not trees are safe. Arborists seem to accept this position and often yield to the demands of clients and lawyers by stating that this tree is safe, that tree is unsafe. Would a doctor commit him/herself to assuring you that you will not become ill during the coming year, or an engineer that your car won't be involved in an accident this year? No, of course not, there are degrees of risk associated with tree failure as there are with other health and safety issues and there are degrees of benefit to be derived from trees.

When providing advice, how then does the arborist avoid making unqualified judgments on tree safety? After all, even the most cautious and prudent arborists must provide guidance to clients. Without a method of measuring the comparative risks from tree failure, advice is likely to err heavily on the side of caution and result in tree removal or other remedial measures more often than is actually necessary. If we adopt a probabilistic risk assessment approach and provide a reasonable and justifiable limit of acceptable risk, arborists can give tree managers odds of harm occurring as a result of tree failure and managers can make well informed decisions.

For a tree-failure hazard to exist there must be potential for failure of the tree, and potential for injury or damage to result from failure. The issue that the tree manager should address is the likelihood, or risk, of a combination of these factors resulting in harm, and the likely severity of harm. Tree managers often rely on the subjective judgment of a succession of arborists when formulating management strategies and addressing budget requirements. In turn, the arborist often feels compelled to be seen to be doing something, sometimes recommending work that they consider necessary for the abatement of a hazard but often recommending work just to be seen to be doing something; being seen to fulfil their duty of care. This approach can result in unnecessary cost and the degradation of both the amenity and conservation value of a site, without having first established the risk of significant harm arising from the hazard.

Many tree owners and managers have no policies or procedures for the management of tree safety and react to only the most extreme of hazardous situations as they arise. Others do nothing more than clear fallen trees. At the other end of the scale, some landowners' set large budgets for tree safety management that may be disproportionate to the risks being managed. The Quantified Tree Risk Assessment system (QTRA) presents a new opportunity to apply tree safety management resources to a structured risk assessment program. Starting with an overview of land use and tree distribution classified by gross features such as age and species we can prioritise risk assessments and refine them to greatest effect according to the availability of resources.

Balancing Risk with Benefits

Tree managers work in a climate of increasing environmental awareness, in which trees are greatly valued and yet are potentially hazardous. There is often a need to reconcile different management objectives, especially on sites where old and perhaps structurally unstable trees are present. As trees age, they increasingly develop features that might compromise their mechanical integrity whilst at the same time providing increasingly diverse wildlife habitats and visual interest. Cavities, fissures and decaying wood together with other niches in the tree, provide habitats for many plants and animals.

A large proportion of higher value habitat trees occur in rural areas, but it is important to recognise that there are also many such trees on the streets of our towns and in gardens, churchyards and city parks. Trees confer many other benefits, being essential to our well being and generally enhancing our built and natural environments. Most trees are to some degree hazardous in that they have potential, no matter how limited, to cause harm but the removal of all tree hazards would lead to certain impoverishment in the quality of human life. Therefore, it is necessary to maintain a balance between the benefits of risk reduction and the cost of that risk reduction, not only financially but also in terms of lost amenity and other tree related benefits.

Do we have Reasonable Expectations of Tree Safety Management?

Property owners and managers, from single householders to municipalities, have a duty of care under the laws of most developed countries to ensure that people and property are not exposed to unreasonable levels of risk from the failure of their trees. In the UK, USA and Australia, for example, failure of duty of care in respect of tree safety is usually prosecuted under the tort of negligence (a tort is a law that has developed through court judgements and is referred to as 'Common Law' rather than being written in 'Statute Law').

To provide an adequate defence in the event of harm resulting from tree failure, it is usually necessary to demonstrate that you have acted reasonably in the management of your trees. In most circumstances, to do absolutely nothing is probably unreasonable. Conversely to throw money at tree safety management is usually unnecessary. Tree managers are generally expected to manage risks associated with trees to maintain them as low as is reasonably practicable.

The concept of 'Reasonable Practicability' is embodied in English and Australian statute law. In essence, 'Reasonable Practicability' is the principle of doing as much or as little as a reasonable person might be expected to do in any particular circumstances. If the defendant in a legal action has established that a risk is small, but that the measures necessary to reduce or eliminate it are great, he or she may be held to be exonerated from taking steps to reduce or eliminate the risk on the ground that it was not reasonably practicable to do so. For example, if a fairground ride were constructed to be absolutely safe, there would be little excitement in the ride, so designers of fairground rides seek a balance somewhere between the ultimate in exhilaration on one hand and absolute safety on the other. The level of risk that users of the ride might be exposed to will usually be reasonable in relation to the thrill that they seek.

In respect of trees, the concept of 'Reasonable Practicability' can be embraced by considering together the degrees of both risks and benefits associated with trees. Lee Paine of the US

Forest Service (Paine1971) wrote, "It is high time we admit that we cannot achieve complete safety - and still provide a desirable product - any more than industry can". This statement captures the essence of 'Reasonable Practicability' and holds true to the present day. It is time to acknowledge that tree safety management should not require us to minimise the risks associated with trees or to make false or unqualified statements such as 'this tree is safe' or 'that tree is unsafe'. Instead, risk of harm from tree failure should be managed at acceptable levels whilst maintaining or maximising the multitude of benefits conferred by trees.

Acceptable Risk

We are constantly exposed to and accept or reject risks of varying degrees. For example, if we desire the convenience of electric lighting, we must accept that, having implemented control measures such as insulation, there is a low risk of electrocution; this is an everyday risk taken and accepted by millions of people.

Having considered The British Medical Association Guide "Living with Risk" (Henderson 1987) and with particular reference to the conclusion "few people would commit their own resources to reduce an annual risk of death that was already as low as 1/10,000", Rodney Helliwell (Helliwell 1990) suggests that 1/10,000 might be a suitable figure to start with as a limit of acceptable risk. The UK Health and Safety Executive (HSE) suggests, "For members of the public who have a risk imposed on them 'in the wider interest' HSE would set this limit at 1/10,000 per annum" (Health and Safety Executive 1996). In the management of trees, a property owner or manager might therefore adopt the 1/10,000 limit of acceptable risk or choose to operate to a higher or lower level.

To put the 1/10,000 probability of significant harm into perspective, table 1 is reproduced from the British Medical Association Guide and illustrates the risk of death (in 1987) from a range of hazards.

Activity	**Risk of an individual dying in any one year**
Smoking 10 cigarettes a day	1 in 200
Influenza	1 in 500
Road accident	1 in 8,000
Playing football	1 in 25,000
Accident at home	1 in 26,000
Accident at work	1 in 43,000
Hit by lighting	1 in 10,000,000
Release of radiation from nearby nuclear power station	1 in 10,000,000

Table 1. (“Living with Risk”, British Medical Association, 1987)

The Quantified Tree Risk Assessment System

The Quantified Tree Risk Assessment system is a probabilistic method of assessing the risk of significant harm from the mechanical failure of trees and expands concepts proposed by Paine (1971), Helliwell (1990, 1991) and Matheny and Clark (1994). QTRA provides a framework for the assessment of the three components of tree-failure risk - Target Value, Probability of Failure and Impact Potential. By first assessing the value or usage of targets upon which trees might fail, tree owners and site managers can establish whether or not and at what degree of rigour tree surveys are required. Where necessary, trees are then considered in terms of both impact potential (size) and probability of failure. Values derived for these three components are then multiplied together and their product is the probability of death or significant harm.

Although it might seem counterintuitive, whether or not trees have significant potential to fail should not be the first consideration. Instead tree managers should consider first the usage of the land on which a tree stands and this in turn will inform the assessment of the trees themselves. Common sense tells us that a large unstable tree located in a remote wilderness might represent a very low risk of harm to people and property but as the interface between trees and human activity becomes more intimate, the risk of harm from tree failure will increase. Harm from trees is measured in terms of loss of life or serious injury, or as monetary loss from damage to property.

The system moves the management of tree safety away from considering trees as either safe or unsafe and thereby requiring definitive judgements of either tree surveyors or tree managers. QTRA is used to quantify the risk of significant harm from tree failure in a way that enables tree managers to balance safety with tree values and operate to a predetermined limit of reasonable or acceptable risk. The system proposes adoption of 1/10,000 as a reasonable limit of acceptable risk from tree failure, although a property owner or manager might adopt the 1/10,000 limit of acceptable risk or choose to operate to a higher or lower level.

Using the Quantified Tree Risk Assessment system, it is possible, not only to identify unacceptable risks, but also to identify the components of the risk, which when adjusted will effectively reduce the overall risk of harm in the most cost efficient or appropriate manner.

Calculating the Risk of Harm

Target Evaluation.

A target is anything of value, which could be harmed in the event of tree failure. Target value is the most significant and most easily quantified element of the assessment. Using QTRA we evaluate the nature of the targets within a survey area before the assessment of trees. This approach enables the tree manager to justify the prioritisation of tree surveys and establish the degree of rigour required of the risk assessment.

When working in the field, manual calculation of probabilities is impractical. To facilitate field assessment, a calculator has been developed (Fig. 1) comprising three vanes, which are rotated to select values from predetermined ranges of probability and calculate the product of the three component probabilities. Having assessed the hazard and the target, the three component probabilities are selected from the ranges 1-6 on the calculator and the three vanes are aligned to display the result in a window. The calculator displays the result as an index (one

thousandth of the reciprocal) of overall probability, which is termed the 'Risk Index' For example, if the risk of harm is 1/10,000, the Risk Index is 10 (10,000 ÷ 1000 = 10). Alternatively, a digital calculator has been developed for use with tree inventory software.

Weather conditions greatly influence tree failure. A walk through woodland and other recreational areas after a moderate storm will often reveal paths and tracks littered with dead and recently living branches. The same weather conditions might at the same time result in reduced pedestrian access to recreational areas, substantially reducing the risk of harm from tree-failure. Often the nature of a defect is such that the probability of failure is greater during windy weather, whilst the probability of the site being occupied during such weather conditions is considerably reduced, e.g. woodland, park or private garden.

People may venture beneath trees during high winds either in the pursuit of recreation, thus voluntarily contributing to their increased exposure harm from tree failure, or out of necessity such as en route from home to a workplace. Even in the latter example, weather conditions may be so extreme that the risk of harm from the failure of not only trees but the collapse of buildings and other storm related hazards is such that to venture out at all would be foolhardy. Conversely, the risk of branch failure in tree species susceptible to summer branch drop increases during periods of hot dry weather when pedestrians might seek shade beneath trees. QTRA includes a facility for considering these scenarios.

Impact Potential

The system categorises impact potential by the diameter of tree stems and branches. An equation derived from weight measurements of trees of different stem diameters is used to produce a data set of comparative weight estimates of trees and branches ranging from 10 to 600 mm diameter. The system uses a fraction of the dry weight of the 600 mm diameter tree in calculating probability of harm. Expressed in this way, a 10mm diameter tree is 1/23,505 of a 600mm diameter tree and a 250mm tree is 1/8.604 of a 600mm diameter tree.

Probability of Failure

Accurately assessing the probability that a tree or branch will fail is highly dependant upon the skill and experience of the assessor. Having assessed the tree, the assessor visualises 1,000, 100, or 10 similar trees in a similar state in a similar environment and estimates how many would be likely to fail during the coming year.

QTRA significantly reduces the influence of assessor subjectivity upon the outcome of the risk assessment and applies a robust structure to the assessment procedure, requiring detailed assessment of the tree only where there is a significant likelihood of unacceptable risk. By first evaluating and mapping both the general nature of the tree population within an administrative area and the range of targets upon which they could fail, the manager of a large tree population can identify the interface between trees and targets, thus enabling prioritization of risk assessments.

A post-mature tree population adjacent to a busy urban thoroughfare might require biannual assessment, whereas the same tree population in a remote wilderness might never be assessed in detail. Between these extremes is a range of inspection frequency, which should be applied as appropriate to the situation. Use of the system without training is likely to lead to misapplication of the data. To ensure, insofar as practicable, that the value of the system is

maintained through consistent application training and ongoing development through a licensing programme is being developed in the United Kingdom.

Examples

Example 1
A 25 metre high, mature English Oak (*Quercus robur*), stem diameter 900mm, in a low use area of woodland with no regularly used paths within 30 metres but with members of the public occasionally entering the target area. This is a mechanically unstable tree with extensive heartwood decay within the main stem and primary branches. A large opening extends to 30% of the stem girth from ground level to a height of 1.5 metres. The residual stem wall averages 100mm thick and exhibits ongoing longitudinal cracking. The crown of the tree contains extensive large diameter dead wood. The most significant part likely to strike the target area is the stem or part of the crown with the weight of the whole tree behind it.

	Target Value		Impact Potential		Probability of failure		Risk of Harm
Probability Ratio	1/120,960	X	1/1	X	1/1	=	1/120,960

The absence of structures and the very low level of public access indicate that detailed assessment of the tree is not essential. If it could be established that pedestrians are 10 times less likely to visit the woodland in very windy weather, when failure is most likely, the overall probability of harm could be reduced to 1/1,209,600 or less.

Example 2a (Before remedial action)
A mature beech (*Fagus sylvatica*) overhanging a minor road of moderate use. The crown of the tree contains long unstable dead branches up to 100mm diameter. The most significant part likely to strike the target area is dead branch wood up to 100mm diameter.

	Target Value		Impact Potential		Probability of failure		Risk of Harm
Probability Ratio	1/72	X	1/82	X	1/1	=	1/5,904

To reduce the risk to a broadly acceptable level an overall probability of 1/10,000 must be achieved. Removal of all dead wood is unnecessary. Removal of dead branches greater than 50mm (2") diameter overhanging the target should reduce the risk to an acceptable level. See example 4 for a method of considering dead or otherwise degraded trees and branches. We might also consider the reduced mass of the dead branches (see example 3).

Example 2b (After remedial action)

	Target Value		Impact Potential		Probability of failure		Risk of Harm
Probability Ratio	1/72	X	1/45	X	1/1	=	1/32,400

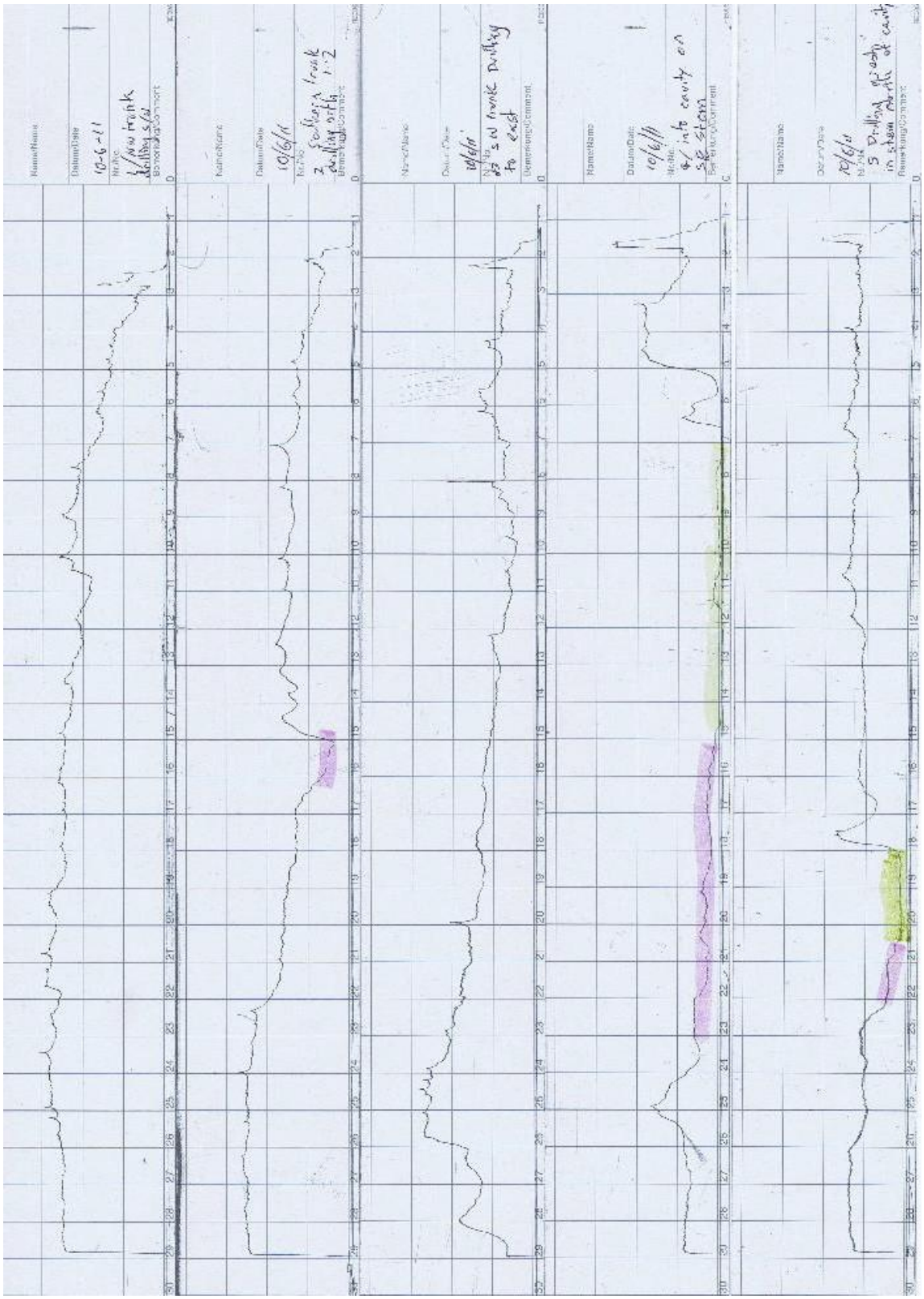
Example 3.
A mature sycamore (Acer pseudoplatanus) with a dead branch of 250mm diameter is overhanging a thoroughfare with pedestrian occupancy of 9 per hour. The most significant part likely to strike the target is the 250mm dia. dead branch.

	Target Value		Impact Potential		Probability of failure		Risk of Harm
Probability Ratio	1/72	X	1/8.6	X	1/10	=	1/6,6192

However, by shedding subordinate branches, the dead branch has degraded to less than half of its original mass. To reflect a mass reduced to 50% or less, the Risk Index 6.19 is multiplied by 2 to produce a revised Risk Index of 12.38 (Risk of Harm 1/12,380).

Appendix 2

Resistograph Graphs



Yellow = cavity; Pink = Decaying or degraded tissue.

Appendix 3

Images

Image 1: Location of hole 1

Image 2: Location of hole 2

Image 3: Location of hole 3

Image 4: Location of hole 4

Image 5: Close-up of hole 4

Image 6: Location of hole 5

Image 7: Aerial roots over much of the old tree

Image 8: Aerial roots coming from the branches

Image 8: The tree behaves more like a strangler fig

Image 9: A matrix of roots and stems provides strength

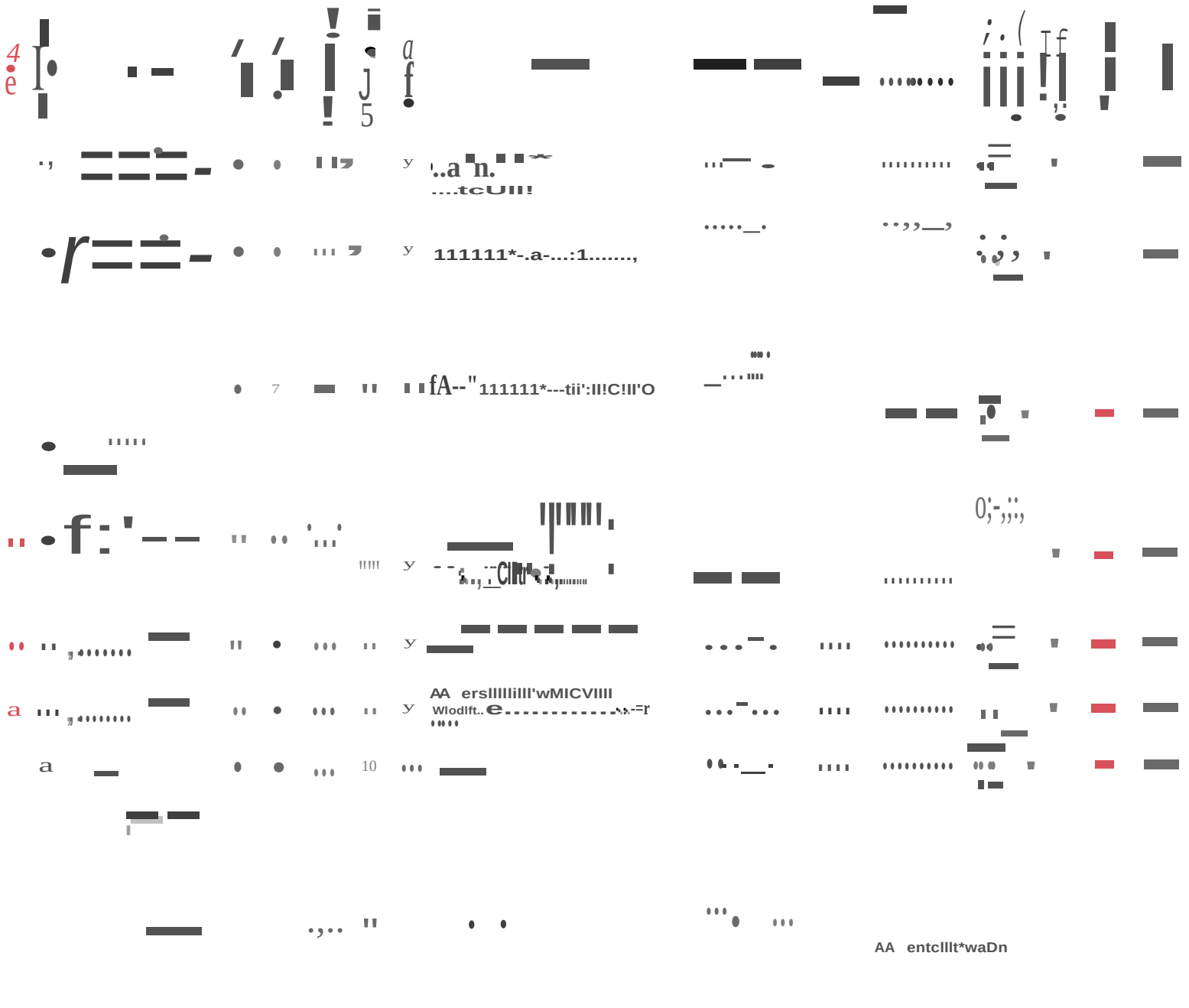
Image 10: the cavity opened up

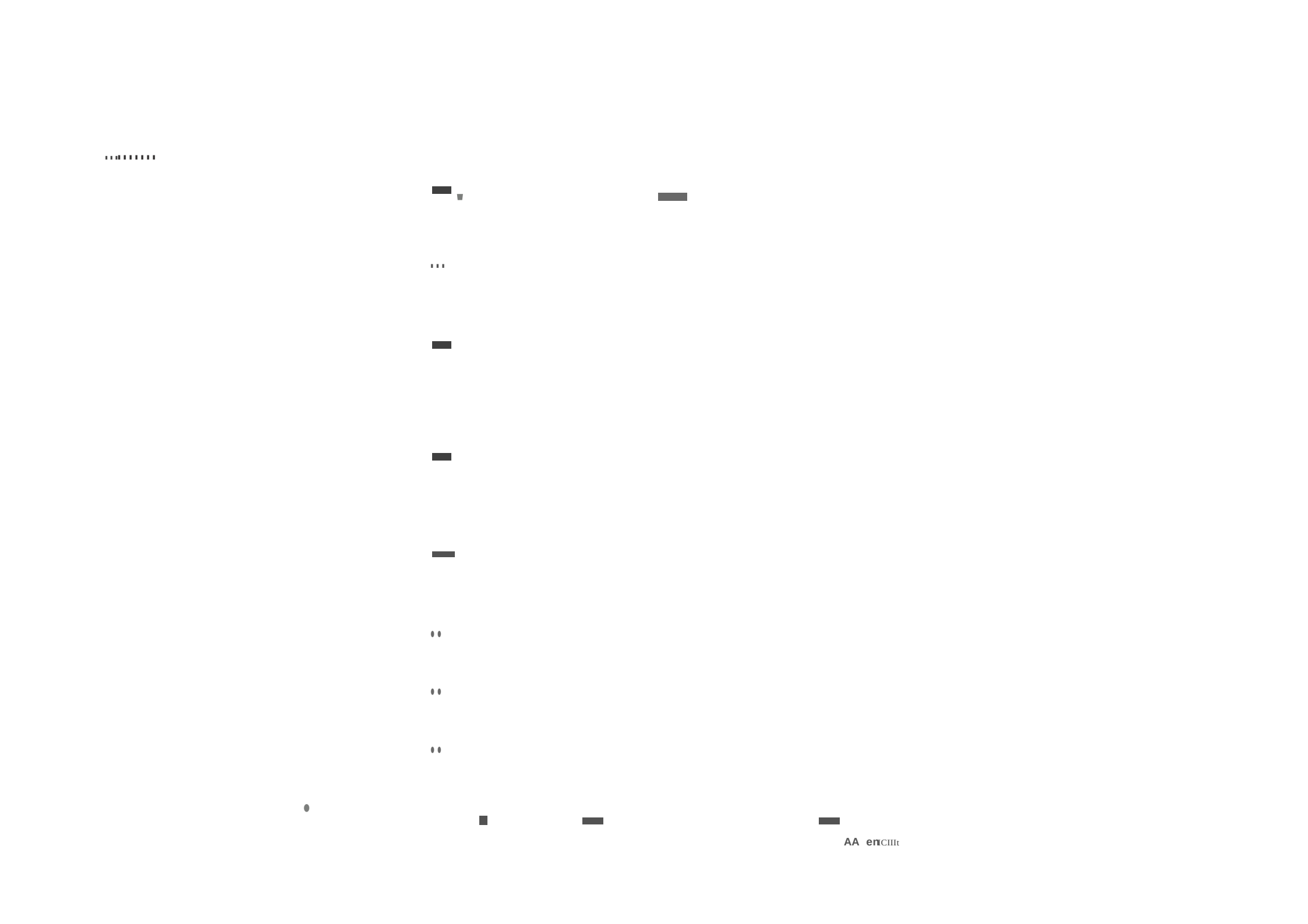
Image 11: Roots clearly visible inside cavity

Appendix 4

Infonnation from others

APPENDIX 3-TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

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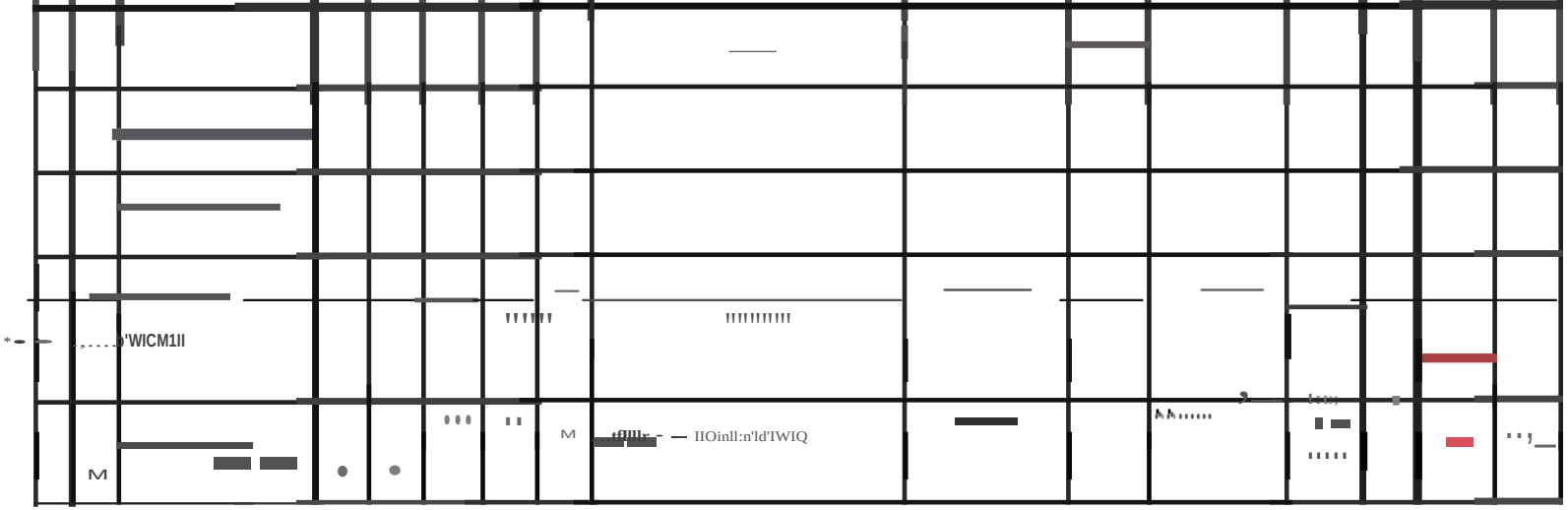

APPENDIX B ADDENDUM 2 TO ARBORISTS REPORT

EARTHSCAPE HORTICULTURAL SERVICES
Arboricultural, Horticultural and Landscape Consultants
ABN 36 082 126 027

10th September 2013

Mr Angus Gardner
Projects Co-ordinator
Shore Scholl
PO Box 1221
NORTH SYDNEY NSW 2059

Ref:

Dear Angus,

Addendum 2 to Arborists Report
Graythwaite – 20 Edward Street North Sydney – Section 75W Submission

I refer to your request to review the proposed amendments to the previously approved Project Application No. MP10_0150 in relation to the abovementioned development. I also refer to my previous Development Impact Assessment Report (Version 5) dated 19th October 2011.

The proposed amendments include bringing forward the demolition of the Ward Building, various landscape works in the vicinity of the Ward building, removal of T60 (a Small-leaf Fig), removal of T51 (Washington Palm) and other minor modifications to the buildings.

Removal of T51 *Washingtonia robusta* (Washington Palm)

T51 is located just south of the Ward Building (refer Plate 1). This tree is a semi-mature specimen of approximately 10 metres in height and 4-5 metres crown spread with a trunk diameter of 350mm. The tree exhibits good health and condition with a Safe Useful Life Expectancy of more than 40 years. The subject tree is considered of moderate Retention Value and was indicated for retention in the original proposal. The proposed modifications will necessitate the removal of this tree.

Whilst the tree has some amenity value as a specimen it has no special ecological or heritage significance. The tree is the same species as four Washington Palms on the southern side of Graythwaite, which are thought to have been planted following conversion of Graythwaite to a Hostel for returned soldiers (c.1918). However, this tree is a much younger specimen and has a fairly random placement, suggesting that it was probably self-sown. As such, it does not appear to have any heritage significance. This is supported by the 2011 Conservation Management Plan (CMP). Given the size of the tree at present, any loss of amenity resulting from the removal of the tree to accommodate the proposed works could be replaced in the short term (next 5-10 years) with new tree planting.

Removal of T60 *Ficus obliqua* (Small-leaf Fig)

T60 is located just to the west of the Ward Building. This tree is a mature specimen of approximately 12 metres in height and 20 metres crown spread with two main trunks of approximately 800 & 1400mm in diameter (refer Plates 2 & 3). The tree divides into multiple lateral primary limbs at 2-3 metres from ground level. The tree appears stable, but exhibits multiple large wounds and decay to the trunk and buttress and extensive decay with a large internal cavity, extending from one side of the largest trunk to the other. The lower trunk is covered with descending aerial roots (refer Plate 4). Most of the primary limbs of the tree appear to have been previously lopped (refer Plate 5). Whilst the crown is now restored, most of the crown is formed from elite epicormic sprouts, some of which

exhibit decay at the junctions (original pruning points). Given the condition of the tree and presence of such extensive defects, it has a Safe Useful Life Expectancy of less than 5 years. Whilst the crown of the tree appears in good health, this tree is considered to have a Low Retention Value due to the nature and size of the cavity and decay in the lower trunk and defects in the branching structure, which renders the tree potentially hazardous in my view.

A resistance test and report prepared by arborist Mark Hartley (refer Appendix A of the Statement of Heritage Impact prepared by TKD Architects) concluded that the whilst the extent of decay found in the trunk was unlikely to result in whole tree failure, the previously lopping had resulted in structurally questionable branching framework (due to previous lopping) which appears currently only supported by the network of aerial roots. The report also concludes that there is some validity for the removal of the tree given the relatively intensive management required to maintain the tree in a safe condition within a school environment.

This tree was indicated for retention in the original proposal but is now proposed to be removed to facilitate proposed remediation works, which involve the removal of between 250mm and 500mm depth of soil within a large portion of the Tree Protection Zone to remove soil contaminants. A number of methodologies have been considered to undertake this work to minimise damage to the tree, including pneumatic and hydraulic excavation and hand excavation, but unfortunately none of these options are really feasible given the type of contaminates and the extent of soil removal required. Conventional mechanical excavation is likely to result in significant damage to the root system and will result in an adverse impact on the tree.

This tree is one of a number of Figs of various species planted throughout Graythwaite c.1875 and is considered to be of high Heritage Significance due to its association with the early development of Graythwaite. However, this value is substantially diminished due to the structural integrity and SULE of the tree. Given its current health and condition and the required remediation works, the removal of the tree is considered warranted subject to appropriate replacement planting with a similar species, sympathetic with the heritage values of the site and era of the original landscape.

If you require any further information regarding the above matter, please do not hesitate to contact me on 9456 4787 or 0402 947 296.
Yours sincerely,

Andrew Morton
B.App.Sci (Horticulture),
A.Dip.App.Sci. (Landscape)
Dip. (Arboriculture) (AQF5)

Plate 1 – Showing south side of the ward building with T51 (Washington Palm) adjacent

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Plate 2 – T60 (Small-leaf Fig), despite having an apparently health crown, is structurally defective

Plate 3 – Lower trunk of T60. The aerial roots seen cover extensive wounding an decay in the lower trunk, with the larger of the two trunks being completely hollow

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Plate 4 – T60 (Small-leaf Fig), showing aerial roots covering extensively decayed lower trunk

Plate 5 – T60 (Small-leaf Fig), showing multiple wounds on primary and secondary limbs due previous lopping, with majority of crown formed from epicormic re-growth.

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