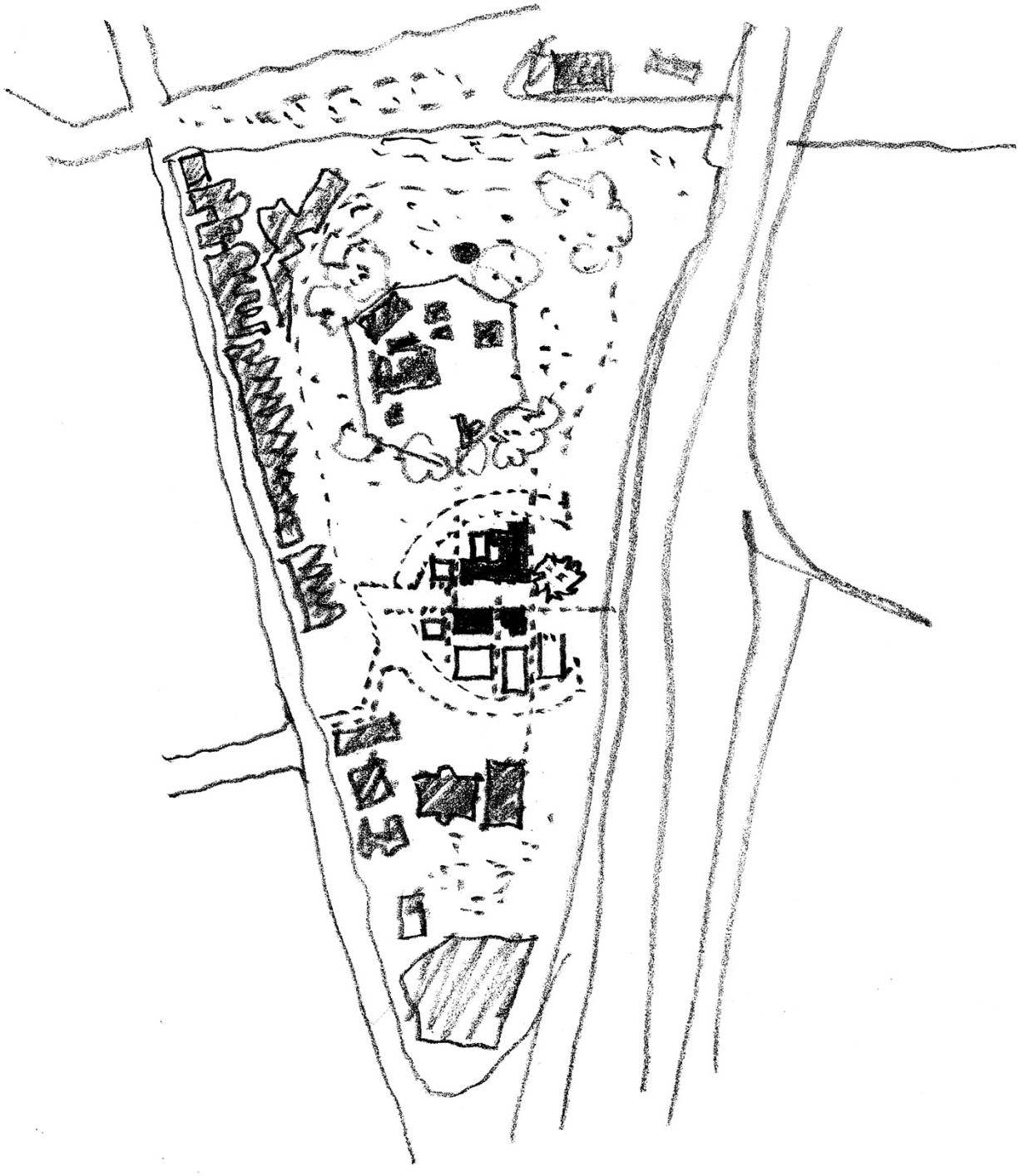
Fort Street Public School
ARBORICULTURAL DEVELOPMENT IMPACT ASSESSMENT REPORT

SSD 10340
Prepared by Birds Tree Consultancy
For School Infrastructure NSW
25 January 2021
REVISION F



Executive Summary

This Arboricultural Development Impact Assessment Report has been commissioned to report on trees within the site of Fort Street Public School NSW. It has been commissioned to outline the health, condition and stability of these trees as well as their viability for retention within the context of the proposed development. The scope of this report includes all trees within areas that may be impacted by the proposed development.

Tree 3 has significant psyllid infestation and corresponding damaged foliage. There is some chlorotic foliage and a thinning canopy.

Tree 4 is in fair but declining condition with a thinning canopy, moderate deadwood and epicormic growth with significant apical dieback.

Tree 10 is in poor and declining condition. Tree 14 has a failed leader.

Tree 1 is in good health and condition however there is evidence of decay present within the canopy. There is decay evident within a primary branch on the eastern side of the canopy at a point of high lever arm stress 1.5m from the junction in a long horizontal end weighted branch. There is also decay evident in the junction of secondary branch on the northern side of canopy. This tree is located within the playground of Fort Street Public School. This tree and these structural defects have been investigated by Resistograph Testing and Level 3 Risk Assessment (TRAQ) In Birds Tree Consultancy Resistograph Report dated 29 October 2020 (See Appendix E). All risk mitigation measures outlined in this report in Appendix E are to be implemented to reduce the risk posed by this tree.

The proposed construction vehicle traffic routes/access to and from the site will impact on the lowest branches of the canopy of Tree 1. Birds Tree Consultancy Pruning Specification dated 11 December 2020 (Appendix F) identifies the branches that are required to be removed, the order junctions pruning is to relate to and the size of branches for pruning. This pruning will reduce the canopy by less than 5% and will not impact the health of the tree, the form of the tree and the canopy will remain balanced. All pruning is to be carried out by arborists with qualifications equivalent or higher than AQF Level 3 under the direction and supervision of the Site Arborist. All pruning is to be in accordance with *AS4373-2007 Pruning of Amenity Trees.*

The proposed On Site Detention (OSD) Tank is located within the TPZ of Tree 1hoever this is located within the footprint of the existing roadway and is behind an existing retaining wall and kerb. In consideration of clause 3.3.4 of *AS4970-2009* and the existing structures providing a barrier to root development, this will not further impact on the TPZ of this tree. All excavation within the TPZ of this tree is to be carried out by non destructive measures such as an Air Knife, Vacuum Truck (operating strictly below 1000Psi) or hand excavation. All excavation within the TPZ is to be carried out under the supervision and direction of the Site Arborist.

All other trees are in good health and condition.

Trees 19 and 31 are listed by the Department of Primary Industries as environmental weed species and are accordingly have assigned low landscape significance and retention values for these trees.

Tree 1 is listed as a Significant Trees by the City of Sydney. Trees 3, 4, 14, 18 and 19 are local endemic species.

The Tree Protection Zones (TPZ) of Trees 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 21 and 22 are encroached by the proposed construction and required earthworks by a total or major encroachment as defined by *AS4970-2009 Protection of Trees on Development Sites.* These trees will not be viable to be retained and are recommended for removal.

The Tree Protection Zones (TPZ) of Trees 18 and 19 are encroached by the proposed timber decking by greater than the minor encroachment as defined by AS 4970-2009 however the timber decking is to be supported om piers on pad footings with no strip footings. Pad footings are to be excavated by hand as directed and supervised by the Site Arborist. Based on this construction method, these trees will remain viable to be retained under the proposed development.

The Tree Protection Zone (TPZ) of Tree 16 will be encroached by the proposed development by 15% which is slightly greater than the minor encroachment as defined by AS 4970-2009. Based on consideration of this species tolerance to root disturbance (Matheny & Clark, p 178) in accordance with clause 3.3.4 of AS4970-2009 and with revised construction methods, this tree will remain viable to be retained under the proposed development. There is no encroachment within the Structural Root Zone of this tree. In order to retain the viability of this tree the following amended construction methods are required.

1. The set out of proposed structures and excavation is to be defined on site prior to works commencing and inspected by the Site Arborist.
2. All excavation within the TPZ of this tree is to be carried out by non destructive measures such as an Air Knife, Vacuum Truck (operating strictly below 1000Psi) or hand excavation. All excavation within the TPZ is to be carried out under the supervision and direction of the Site Arborist.

Trees 16 and 20 will have significant impact on the canopy of this tree due to the location of the proposed buildings relative to the tree canopy. Construction of the building including scaffold and hoarding will require severe canopy reduction pruning that will leave this tree unbalanced, with poor form and significant resultant epicormic growth. Scaffold and hoarding design is required to accommodate the existing canopy in order to minimise the required clearance pruning. All required pruning is to be specified by the Site Arborist within a Tree Pruning Specification once the extent of the building and scaffold design is complete. All pruning is to be carried our by arborists with qualifications equivalent or higher than AQF Level 3 under the direction and supervision of the Site Arborist. All pruning is to be in accordance with *AS4373-2007 Pruning of Amenity Trees.*

All other trees are viable to be retained and are to be protected as defined below.

Recommendations for tree retention or removal are summarised as follows:

Tree no.	Species	Recommendations	Comments	Retention value

1	*Ficus macrophylla*	Retain	Decay in primary branch on eastern side at point of high lever arm stress 1.5m from junction in long horizontal end weighted branch. Decay in secondary branch on northern side of canopy. Refer to Appendix E for Risk Mitigation measures. Refer to Appendix for Pruning Specification.	High
2	*Lophostemon confertus*	Remove	Not viable due to encroachment by the proposed development.	High
3.	*Eucalyptus robusta*	Remove	Not viable due to encroachment by the proposed development.	Medium
4.	*Eucalyptus tereticornis*	Remove	Not viable due to encroachment by the proposed development.	High
5.	*Schinus terebinthifolius*	Remove	Not viable due to encroachment by the proposed development.	Low
6.	*Murraya paniculata*	Remove	Not viable due to encroachment by the proposed development.	Low
7.	*Banksia integrifolia*	Remove	Not viable due to encroachment by the proposed development.	High
8.	*Callistemon viminalis*	Remove	Not viable due to encroachment by the proposed development.	Medium
9.	*Callistemon viminalis*	Remove	Not viable due to encroachment by the proposed development.	Medium
10.	*Hakea salicifolia*	Remove	Not viable due to encroachment by the proposed development.	Medium
11.	*Callistemon viminalis*	Remove	Not viable due to encroachment by the proposed development.	Medium

12.	*Citharexylum spinosum*	Remove	Not viable due to encroachment by the proposed development.	Medium
13.	*Callistemon viminalis*	Remove	Not viable due to encroachment by the proposed development.	Medium
14.	*Acmena smithii*	Remove	Not viable due to encroachment by the proposed development.	High
15.	*Angophora floribunda*	Remove	Not viable due to encroachment by the proposed development.	Low
16.	*Jacaranda mimosifolia*	Retain	Viable to be retained with revised methods as defined in 7.0.	High
17.	*Celtis sinensis*	Remove	Not viable due to encroachment by the proposed development.	Low
18.	*Eucalyptus piperita*	Retain	Viable to be retained with revised methods as defined in 7.0.	High
19.	*Eucalyptus saligna*	Retain	Viable to be retained with revised methods as defined in 7.0.	High
20.	*Ulmus parvifolia*	Retain	Viable to be retained with revised methods as defined in 7.0.	Medium
21.	*Acmena smithii*	Remove	Not viable due to encroachment by the proposed development.	Medium
22.	*Acmena smithii*	Remove	Not viable due to encroachment by the proposed development.	Medium

Contents

1.0 Scope of Works

This Arboricultural Development Impact Assessment Report has been commissioned to report on trees within the site of Fort Street Public School NSW. It has been commissioned to outline the health, condition and stability of these trees as well as their viability for retention within the context of the proposed development. The scope of this report includes all trees within areas that may be impacted by the proposed development.

Approval is sought for the expansion of Fort Street Public School to accommodate a total of 600 primary school students. Specifically:

- **Site preparation, demolition and excavation**
  - Site remediation.
  - Demolition of the southernmost school building, the garage and storage shed west and east of the Bureau of Meteorology Building, and the toilet block adjoining the main school building.
  - Selective removal of various elements of the main school building, as well as minor and insignificant elements of the Bureau of Meteorology Building and the Messenger's Cottage to facilitate refurbishment and future use of these buildings.
  - Bulk excavation works to facilitate the new southern buildings and western addition to the main school building.
  - Tree removal.
  - Installation of hydraulic and electrical services.

- **Land use**
  - Use of all buildings for the purpose of a school.

- **Existing buildings**
  - Retention, refurbishment and extension of the existing Fort Street Public School, including construction of a new roof and rooftop additions.
  - Retention and refurbishment of the Bureau of Meteorology Building and internal alterations and additions.
  - Retention and minor alterations to the Messenger's Cottage.

- **New buildings**
  - Construction of two new buildings on the western part of the site for classrooms and a staff room.
  - Construction of two new, interconnected school buildings on the southern third of the site.
  - Construction of a new communal hall and canteen building.

- **Landscaping**
  - Retention of the existing large fig tree.
  - Landscaping works throughout the site, including construction of a new amphitheater, a deck around the fig tree, new central plaza, and a multi-purpose forecourt.

- Landscaping of roof gardens on top of the new southern buildings, the existing Bureau of Meteorology Building and the EEC building.

- **Other works**
  - Construction of a new pedestrian link bridge across the Cahill Expressway on the western side of the site.
  - Works to the existing entrance road, including alterations to the Bradfield Tunnel Services Building.
  - Modifications to existing pick-up / drop-off arrangements.
  - Provision of signage zones.

On the 2nd of April 2019, Glenn Bird of Birds Tree Consultancy attended site and inspected the subject trees from the ground. There was no aerial inspection carried out. A Visual Tree Assessment was undertaken in accordance with Visual Tree Assessment (VTA) guidelines (Mattheck and Breloer, 1994). Tree heights were measured using a Nikon Forestry 550 Heightmeter.

2.0 Site Analysis

2.1 Site

The subject site is Fort Street Public School NSW. The subject trees are located within or adjacent to the boundaries of this site.

2.2 Documentation

This Development Impact Assessment Report is based on FJMT Drawing FSS 8002 Rev 03 Dated 18/12/2019.

2.3 Topography

The site is relatively flat in the vicinity of the subject trees. Trees 3, 4, 16, 17, 18, 19 and 20 are in close proximity to concrete retaining walls. Refer to survey for greater details of levels.

2.4 Identification

Trees are as identified in the attached inspection forms in Appendix C and shown in in Appendix D.

2.5 Soils

Soil material and horizons were not tested for this report.

3.0 Existing Trees

The following trees were inspected from the ground and the following items identified. Please refer also to the attached inspection data in Appendix A.

3.1 Tree 1 *Ficus macrophylla*

This mature tree is approximately 21m tall with a canopy spread of 24m. It has a single trunk with a diameter at breast height (DBH) of 1750mm. This tree is in good health and condition with minimal deadwood and epicormic growth. There is evidence of decay in

primary branch on eastern side at point of high lever arm stress 1.5m from junction in long horizontal end weighted branch. There is also decay in secondary branch on northern side of canopy.

Figure 1 - Tree 1 Decay on eastern side of canopy

Figure 2 - Decay in secondary branch north of Tree 1

3.2 Tree 2 *Lophostemon confertus*

This mature tree is located within timber decking and it is approximately 7m tall with a canopy spread of 6m. It has a single trunk with a DBH of 360mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

Figure 3 - Tree 2

3.3 Tree 3. *Eucalyptus robusta*

This mature tree is approximately 14m tall with a canopy spread of 7m. It has a single trunk with a DBH of 290mm. This tree is in fair health and condition with a thinning canopy, minimal deadwood and significant epicormic growth. There is evidence of significant lerp psyllid infestation.

3.4 Tree 4. *Eucalyptus tereticornis*

This mature tree is approximately 16m tall with a canopy spread of 12m. It has a single trunk with a DBH of 1900mm. This tree is in fair health and declining condition with a thinning canopy, moderate deadwood, significant epicormic growth and significant apical dieback.

Figure 4 - Tree 4

3.5 Tree 5. *Schinus terebinthifolius*

This mature tree is approximately 7m tall with a canopy spread of 10m. It has multiple (3) co-dominant trunks from the base with an aggregate DBH of 415mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.6 Tree 6. *Murraya paniculata*

This mature tree is immediately adjacent to a wall and it is approximately 6m tall with a canopy spread of 7m. It has multiple co-dominant trunks from the base with an aggregate DBH of 280mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.7 Tree 7. *Banksia integrifolia*

This mature tree is approximately 12m tall with a canopy spread of 7m. It has a single trunk with a DBH of 390mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.8 Tree 8. *Callistemon viminalis*

This mature tree is approximately 5m tall with a canopy spread of 3m. It has multiple co-dominant trunks from the base with an aggregate DBH of 240mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.9 Tree 9. *Callistemon viminalis*

This mature tree is approximately 5m tall with a canopy spread of 4m. It has multiple co-dominant trunks from the base with an aggregate DBH of 220mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.10 Tree 10. *Hakea salicifolia*

This mature tree is approximately 7m tall with a canopy spread of 4m. It has a single trunk with a DBH of 230mm. This tree is in poor health and declining condition with a sparse canopy, minimal deadwood and epicormic growth.

3.11 Tree 11. *Callistemon viminalis*

This mature tree is approximately 7.5m tall with a canopy spread of 6m. It has multiple (3) co-dominant trunks from the base with an aggregate DBH of 200mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.12 Tree 12. *Citharexylum spinosum*

This mature tree is approximately 10m tall with a canopy spread of 4m. It has a single trunk with a DBH of 130mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.13 Tree 13. *Callistemon viminalis*

This mature tree is approximately 8m tall with a canopy spread of 4m. It has a single trunk with a DBH of 120mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.14 Tree 14. *Acmena smithii*

This mature tree is approximately 9m tall with a canopy spread of 4m. It has a single trunk with a DBH of 105mm. This tree is in fair health and condition with a thinning canopy, minimal deadwood and epicormic growth.

3.15 Tree 15. *Angophora floribunda*

This mature tree is approximately 9m tall with a canopy spread of 6m. It has a single trunk with a DBH of 190mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.16 Tree 16. *Jacaranda mimosifolia*

This mature tree is approximately 9m tall with a canopy spread of 7m. It has a single trunk with a slight lean to the north and a DBH of 390mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.17 Tree 17. *Celtis sinensis*

This mature tree is approximately 13m tall with a canopy spread of 11m. It has twin co-dominant trunks from the base with an aggregate DBH of 520mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.18 Tree 18. *Eucalyptus piperita*

This mature tree is a “Red stringybark” and it is approximately 7m tall with a canopy spread of 4m. It has a single trunk with a DBH of 120mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.19 Tree 19. *Eucalyptus saligna*

This mature tree is approximately 16m tall with a canopy spread of 12m. It has a single trunk with a DBH of 390mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.20 Tree 20. *Ulmus parvifolia*

This mature tree is immediately adjacent to retaining wall and it is approximately 12m tall with a canopy spread of 13m. It has twin co-dominant trunks from 1m above the base with an aggregate DBH of 450mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.21 Tree 21. *Acmena smithii*

This mature tree is immediately adjacent to existing building and it is approximately 10m tall with a canopy spread of 4m. It has a single trunk with a DBH of 150mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.22 Tree 22. *Acmena smithii*

This mature tree is immediately adjacent to existing building and it is approximately 10m tall with a canopy spread of 5m It has twin co-dominant trunks from the base with an aggregate DBH of 280mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

4.0 Landscape Significance of Trees

4.1 Landscape Significance

The significance of a tree within the landscape is a factor of the health and condition of the tree, vitality, the form of the tree, environmental, cultural, amenity and heritage value.

4.2 Methodology of Determining Landscape Significance

For the purpose of this report, the Significance of a Tree, Assessment Rating System (STARS) as developed by the Institute of Australian Consulting Arborists (IACA) has been implemented. Please refer to Appendix A for greater detail of this assessment system. This system defines Landscape Significance for individual trees as High, Medium or Low Significance.

4.3 Landscape Significance of Subject Trees

Based on our assessment of the subject trees and implementation of the IACA Significance of a Tree, Assessment Rating System, the Landscape Significance of the Subject Trees was determined as shown in Table 1

Tree no.	Species	Landscape Significance	Significance Notes
1	*Ficus macrophylla*	High	Large mature tree providing shade within the school playground. This tree is listed as a Significant Tree by the City of Sydney.
2	*Lophostemon confertus*	High	Semi mature tree within the playground. Will provide shade within playground.
3.	*Eucalyptus robusta*	Medium	Tree provides shade and potential habitat.
4.	*Eucalyptus tereticornis*	High	Locally endemic species providing shade and potential habitat.
5.	*Schinus terebinthifolius*	Low	Species is listed by Department of Primary Industries as an

			Environmental Weed and invasive species.
6.	*Murraya paniculata*	Low	Large Shrub
7.	*Banksia integrifolia*	High	Local native species providing habitat and food for fauna.
8.	*Callistemon viminalis*	Medium	Local native species providing habitat and food for fauna.
9.	*Callistemon viminalis*	Medium	Native species providing habitat and food for fauna.
10.	*Hakea salicifolia*	Medium	Native species providing habitat and food for fauna.
11.	*Callistemon viminalis*	Medium	Native species providing habitat and food for fauna.
12.	*Citharexylum spinosum*	Medium	
13.	*Callistemon viminalis*	Medium	Native species providing habitat and food for fauna.
14.	*Acmena smithii*	High	Native species providing habitat and food for fauna.
15.	*Angophora floribunda*	Low	Native species providing habitat and food for fauna.
16.	*Jacaranda mimosifolia*	High	Shade Tree
17.	*Celtis sinensis*	Low	Species is listed by Department of Primary Industries as an Environmental Weed and invasive species.
18.	*Eucalyptus piperita*	High	Local native species. Shae tree providing habitat and food for fauna.

19.	*Eucalyptus saligna*	High	Local native species. Shade tree providing habitat and food for fauna.
20.	*Ulmus parvifolia*	Medium	Shade Tree
21.	*Acmena smithii*	Medium	Native species providing habitat and food for fauna. Immediately adjacent existing building.
22.	*Acmena smithii*	Medium	Native species providing habitat and food for fauna. Immediately adjacent existing building.

Table 1 - Landscape Significance

5.0 Subject Tree Retention Value

5.1 Tree Retention Value Methodology

For the purpose of this report, the Tree Retention Values have been assessed by incorporating Landscape Significance Values as determined in 4.0 with the Useful Life Expectancy of the subject trees and assessing the retention values based on the Tree Retention Value Priority Matrix as developed by the Institute of Australian Consulting Arborists (IACA). Please refer to Appendix B for greater detail of this Tree Retention Value Priority Matrix. This matrix defines Landscape Significance for individual trees as High, Medium or Low Retention Value as well as Priority for Removal.

5.2 Retention Value of Subject Trees

Based on our assessment of the subject trees and implementation of the IACA Tree Retention Value Priority Matrix, the Retention Values of the Subject Trees were determined as shown in Table 2.

Tree no.	Species	Retention Value
1	*Ficus macrophylla*	High
2	*Lophostemon confertus*	High
3.	*Eucalyptus robusta*	Medium
4.	*Eucalyptus tereticornis*	High
5.	*Schinus terebinthifolius*	Low

6.	*Murraya paniculata*	Low
7.	*Banksia integrifolia*	High
8.	*Callistemon viminalis*	Medium
9.	*Callistemon viminalis*	Medium
10.	*Hakea salicifolia*	Medium
11.	*Callistemon viminalis*	Medium
12.	*Citharexylum spinosum*	Medium
13.	*Callistemon viminalis*	Medium
14.	*Acmena smithii*	High
15.	*Angophora floribunda*	Low
16.	*Jacaranda mimosifolia*	High
17.	*Celtis sinensis*	Low
18.	*Eucalyptus piperita*	High
19.	*Eucalyptus saligna*	High
20.	*Ulmus parvifolia*	Medium
21.	*Acmena smithii*	Medium
22.	*Acmena smithii*	Medium

Table 2 – Tree Retention Value

6.0 Impact of Development

6.1 Tree Protection Zone

Tree Protection Zones (TPZs) have been defined for the subject trees in order to define the encroachment of the proposed development in accordance with *AS4970-2009*. The TPZs required have been taken as a circular area with a radius 12 x the diameter at breast height of the tree. This requirement is in line with Australian Standard AS 4970-2009 Protection of Trees on Development Sites. This standard defines a maximum of 10% encroachment to be minimal encroachment. Any encroachment over 10% requires the site arborist to give consideration as to the viability of the tree due to the proposed development.

Tree no.	Species	TPZ Radius (m)	TPZ Encroachment (%)	SRZ Radius (m)
1	*Ficus macrophylla*	15	5	4.4
2	*Lophostemon confertus*	4.32	100	2.3
3.	*Eucalyptus robusta*	3.48	100	2.1
4.	*Eucalyptus tereticornis*	10.8	100	3.3
5.	*Schinus terebinthifolius*	4.98	100	2.5
6.	*Murraya paniculata*	3.36	100	2.0
7.	*Banksia integrifolia*	4.68	100	2.3
8.	*Callistemon viminalis*	2.88	100	1.9
9.	*Callistemon viminalis*	2.64	100	1.9
10.	*Hakea salicifolia*	2.76	100	2.0
11.	*Callistemon viminalis*	2.4	100	1.8

12.	*Citharexylum spinosum*	2	100	1.5
13.	*Callistemon viminalis*	2	100	1.6
14.	*Acmena smithii*	2	40	1.4
15.	*Angophora floribunda*	2.28	100	1.8
16.	*Jacaranda mimosifolia*	4.68	15	2.3
17.	*Celtis sinensis*	6.24	35	2.6
18.	*Eucalyptus piperita*	2	<10	1.6
19.	*Eucalyptus saligna*	4.68	<10	2.3
20.	*Ulmus parvifolia*	5.4	10	2.5
21.	*Acmena smithii*	2	40	1.6
22.	*Acmena smithii*	3.36	40	2.1

6.2 Development Impact

6.2.1. Tree 1 *Ficus macrophylla*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be encroached by the proposed development by 5% which is less than the minor encroachment as defined by AS 4970-2009. This assessment is based on Sketch Drawing SK200623 and advice that the only excavation impacting the TPZ is within the proposed service enclosure construction. All pier construction supporting new timber decking is to be constructed supported on individual pad footings that are excavated by hand under the direction and supervision of the Site Arborist. This tree will be viable to be retained under the proposed development.

6.2.2. Tree 2 *Lophostemon confertus*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be totally encroached by the proposed development. This tree will not be viable to be retained under the proposed development.

6.2.3. Tree 3 *Eucalyptus robusta*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be totally encroached by the proposed pavement and colonnade. This tree will not be viable to be retained under the proposed development.

6.2.4. Tree 4 *Eucalyptus tereticornis*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be totally encroached by the proposed development. This tree will not be viable to be retained under the proposed development.

6.2.5. Tree 5 *Schinus terebinthifolius*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be totally

encroached by the proposed OSD and paving. This tree will not be viable to be retained under the proposed development.

6.2.6. Tree 6 *Murraya paniculata*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be totally encroached by the proposed development. This tree will not be viable to be retained under the proposed development.

6.2.7. Tree 7 *Banksia integrifolia*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be totally encroached by the proposed development. This tree will not be viable to be retained under the proposed development.

6.2.8. Tree 8 *Callistemon viminalis*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be totally encroached by the proposed development. This tree will not be viable to be retained under the proposed development.

6.2.9. Tree 9 *Callistemon viminalis*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be totally encroached by the proposed development. This tree will not be viable to be retained under the proposed development.

6.2.10. Tree 10 *Hakea salicifolia*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be totally encroached by the proposed development. This tree will not be viable to be retained under the proposed development.

6.2.11. Tree 11 *Callistemon viminalis*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be totally encroached by the proposed development. This tree will not be viable to be retained under the proposed development.

6.2.12. Tree 12 *Citharexylum spinosum*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be totally encroached by the proposed development. This tree will not be viable to be retained under the proposed development.

6.2.13. Tree 13 *Callistemon viminalis*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be totally encroached by the proposed development. This tree will not be viable to be retained under the proposed development.

6.2.14. Tree 14 *Acmena smithii*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be encroached by the proposed development by 40% which is significantly greater than the minor encroachment as defined by AS 4970-2009. This tree will not be viable to be retained under the proposed development.

6.2.15. Tree 15 *Angophora floribunda*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be total encroached by the proposed timber decking. This tree will not be viable to be retained under the proposed development.

6.2.16. Tree 16 *Jacaranda mimosifolia*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be encroached by the proposed development by 15% which is slightly greater than the minor encroachment as defined by AS 4970-2009. Based on consideration of this species tolerance to root disturbance (Matheny & Clark, p 178) in accordance with clause 3.3.4 of *AS4970-2009,* this tree will remain viable to be retained under the proposed development

6.2.17. Tree 17 *Celtis sinensis*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be encroached by the proposed development by 35% which is significantly greater than the minor encroachment as defined by AS 4970-2009. This tree will not be viable to be retained under the proposed development.

6.2.18. Tree 18 *Eucalyptus piperita*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be encroached by the proposed timber decking by 30% which is significantly greater than the minor encroachment as defined by AS 4970-2009 however the timber decking is to be supported om piers on pad footings with no strip footings. Pad footings are to be excavated by hand as directed and supervised by the Site Arborist. Based on this construction method, this tree will remain viable to be retained under the proposed development.

6.2.19. Tree 19 *Eucalyptus saligna*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be encroached by the proposed development by 50% which is significantly greater than the minor encroachment as defined by AS 4970-2009 however the timber decking is to be supported om piers on pad footings with no strip footings. Pad footings are to be

excavated by hand as directed and supervised by the Site Arborist. Based on this construction method, this tree will remain viable to be retained under the proposed development.

6.2.20. Tree 20 *Ulmus parvifolia*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be encroached by the proposed development by 10% which is equal to the minor encroachment as defined by AS 4970-2009. The proposed building is approximately 3m from the trunk of this tree and the canopy extends approximately 6-7m in this direction. Construction of the building including scaffold and hoarding will require significant canopy reduction pruning that will leave this tree unbalanced, with poor form and significant resultant epicormic growth.

6.2.21. Tree 21 *Acmena smithii*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be encroached by the proposed development by 40% which is significantly greater than the minor encroachment as defined by AS 4970-2009. This tree will not be viable to be retained under the proposed development.

6.2.22. Tree 22 *Acmena smithii*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be encroached by the proposed development by 40% which is significantly greater than the minor encroachment as defined by AS 4970-2009. This tree will not be viable to be retained under the proposed development.

7.0 Recommendations

Tree 3 has significant psyllid infestation and corresponding damaged foliage. There is some chlorotic foliage and a thinning canopy.

Tree 4 is in fair but declining condition with a thinning canopy, moderate deadwood and epicormic growth with significant apical dieback.

Tree 10 is in poor and declining condition. Tree 14 has a failed leader.

Tree 1 is in good health and condition however there is evidence of decay present within the canopy. There is decay evident within a primary branch on the eastern side of the canopy at a point of high lever arm stress 1.5m from the junction in a long horizontal end weighted branch. There is also decay evident in the junction of secondary branch on the northern side of canopy. This tree is located within the playground of Fort Street Public School. This tree and these structural defects have been investigated by Resistograph Testing and Level 3 Risk Assessment (TRAQ) In Birds Tree Consultancy Resistograph Report dated 29 October 2020 (See Appendix E). All risk mitigation measures outlined in this report in Appendix E are to be implemented to reduce the risk posed by this tree.

The proposed construction vehicle traffic routes/access to and from the site will impact on the lowest branches of the canopy of Tree 1. Birds Tree Consultancy Pruning Specification dated 11 December 2020 (Appendix F) identifies the branches that are required to be removed, the order junctions pruning is to relate to and the size of branches for pruning. This pruning will reduce the canopy by less than 5% and will not impact the health of the tree, the form of the tree and the canopy will remain balanced. All pruning is to be carried our by arborists with qualifications equivalent or higher than AQF Level 3 under the direction and supervision of the Site Arborist. All pruning is to be in accordance with *AS4373-2007 Pruning of Amenity Trees.*

The proposed On Site Detention (OSD) Tank is located within the TPZ of Tree 1hoever this is located within the footprint of the existing roadway and is behind an existing retaining wall and kerb. In consideration of clause 3.3.4 of *AS4970-2009* and the existing structures providing a barrier to root development, this will not further impact on the TPZ of this tree. All excavation within the TPZ of this tree is to be carried out by non destructive measures such as an Air Knife, Vacuum Truck (operating strictly below 1000Psi) or hand excavation. All excavation within the TPZ is to be carried out under the supervision and direction of the Site Arborist.

All other trees are in good health and condition.

Trees 19 and 31 are listed by the Department of Primary Industries as environmental weed species and are accordingly have assigned low landscape significance and retention values for these trees.

Tree 1 is listed as a Significant Trees by the City of Sydney. Trees 3, 4, 14, 18 and 19 are local endemic species.

The Tree Protection Zones (TPZ) of Trees 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 21 and 22 are encroached by the proposed construction and required earthworks by a total or major encroachment as defined by *AS4970-2009 Protection of Trees on*

Development Sites. These trees will not be viable to be retained and are recommended for removal.

The Tree Protection Zones (TPZ) of Trees 18 and 19 are encroached by the proposed timber decking by greater than the minor encroachment as defined by AS 4970-2009 however the timber decking is to be supported om piers on pad footings with no strip footings. Pad footings are to be excavated by hand as directed and supervised by the Site Arborist. Based on this construction method, these trees will remain viable to be retained under the proposed development.

The Tree Protection Zone (TPZ) of Tree 16 will be encroached by the proposed development by 15% which is slightly greater than the minor encroachment as defined by AS 4970-2009. Based on consideration of this species tolerance to root disturbance (Matheny & Clark, p 178) in accordance with clause 3.3.4 of AS4970-2009 and with revised construction methods, this tree will remain viable to be retained under the proposed development. There is no encroachment within the Structural Root Zone of this tree. In order to retain the viability of this tree the following amended construction methods are required.

1. The set out of proposed structures and excavation is to be defined on site prior to works commencing and inspected by the Site Arborist.
2. All excavation within the TPZ of this tree is to be carried out by non destructive measures such as an Air Knife, Vacuum Truck (operating strictly below 1000Psi) or hand excavation. All excavation within the TPZ is to be carried out under the supervision and direction of the Site Arborist.

Trees 16 and 20 will have significant impact on the canopy of this tree due to the location of the proposed buildings relative to the tree canopy. Construction of the building including scaffold and hoarding will require severe canopy reduction pruning that will leave this tree unbalanced, with poor form and significant resultant epicormic growth. Scaffold and hoarding design is required to accommodate the existing canopy in order to minimise the required clearance pruning. All required pruning is to be specified by the Site Arborist within a Tree Pruning Specification once the extent of the building and scaffold design is complete. All pruning is to be carried our by arborists with qualifications equivalent or higher than AQF Level 3 under the direction and supervision of the Site Arborist. All pruning is to be in accordance with *AS4373-2007 Pruning of Amenity Trees.*

All other trees are viable to be retained and are to be protected as defined below.

Recommendations for tree retention or removal are summarised as follows:

Tree no.	Species	Recommendations	Comments	Retention value
1	*Ficus macrophylla*	Retain	Decay in primary branch on eastern side at point of high lever arm stress 1.5m from junction in long horizontal end weighted branch. Decay	High

			in secondary branch on northern side of canopy. Refer to Appendix E for Risk Mitigation measures. Refer to Appendix for Pruning Specification.	
2	*Lophostemon confertus*	Remove	Not viable due to encroachment by the proposed development.	High
3.	*Eucalyptus robusta*	Remove	Not viable due to encroachment by the proposed development.	Medium
4.	*Eucalyptus tereticornis*	Remove	Not viable due to encroachment by the proposed development.	High
5.	*Schinus terebinthifolius*	Remove	Not viable due to encroachment by the proposed development.	Low
6.	*Murraya paniculata*	Remove	Not viable due to encroachment by the proposed development.	Low
7.	*Banksia integrifolia*	Remove	Not viable due to encroachment by the proposed development.	High
8.	*Callistemon viminalis*	Remove	Not viable due to encroachment by the proposed development.	Medium
9.	*Callistemon viminalis*	Remove	Not viable due to encroachment by the proposed development.	Medium
10.	*Hakea salicifolia*	Remove	Not viable due to encroachment by the proposed development.	Medium
11.	*Callistemon viminalis*	Remove	Not viable due to encroachment by the proposed development.	Medium
12.	*Citharexylum spinosum*	Remove	Not viable due to encroachment by the proposed development.	Medium
13.	*Callistemon viminalis*	Remove	Not viable due to encroachment by the proposed development.	Medium

14.	*Acmena smithii*	Remove	Not viable due to encroachment by the proposed development.	High
15.	*Angophora floribunda*	Remove	Not viable due to encroachment by the proposed development.	Low
16.	*Jacaranda mimosifolia*	Retain	Viable to be retained with revised methods as defined in 7.0.	High
17.	*Celtis sinensis*	Remove	Not viable due to encroachment by the proposed development.	Low
18.	*Eucalyptus piperita*	Retain	Viable to be retained with revised methods as defined in 7.0.	High
19.	*Eucalyptus saligna*	Retain	Viable to be retained with revised methods as defined in 7.0.	High
20.	*Ulmus parvifolia*	Retain	Viable to be retained with revised methods as defined in 7.0.	Medium
21.	*Acmena smithii*	Remove	Not viable due to encroachment by the proposed development.	Medium
22.	*Acmena smithii*	Remove	Not viable due to encroachment by the proposed development.	Medium

8.0 Pre-Construction Tree Protection Measures

8.1 General

All tree protection works shall be carried out before excavation, grading and site works commence. Tree protection works shall be inspected and approved by a Consulting Arborist meeting AQF Level 5 prior to construction works commencing.

Storage of materials, mixing of materials, vehicle parking, disposal of liquids, machinery repairs and refueling, site office and sheds, and the lighting of fires, stockpiling of soil, rubble or any debris shall not be carried out within the TPZ of existing trees. No backfilling shall occur within the TPZ of existing trees. Trees shall not be removed or lopped unless specific instruction is given in writing by the Superintendent.

8.2 Identification

All trees to be protected shall be clearly identified and all TPZs surveyed.

8.3 Protective Fence

Fencing is to be erected around existing trees to be retained. In addition to this protective fencing within the site, Protective Fencing is to be installed to the full extent of the TPZs within the site. This fencing is to be erected prior to any materials being brought on site or before any site, civil works or construction works commence. The fence shall enclose a sufficient area so as to prevent damage to the TPZ as defined on Appendix D Tree Protection Plan and as defined in 5.1 above. Fence to comprise 1800mm high chain wire mesh fixed to 50mm diameter Galvanised steel posts. Panels should be securely fixed top and bottom to avoid separation. No storage of building materials, tools, paint, fuel or contaminants and the like shall occur within the fenced area.

8.4 Mulching

Install mulch to the extent of all tree protection fencing. Use a leaf mulch conforming to AS 4454 which is free of deleterious and extraneous matter such as soil, weeds, sticks and stones and consisting of a minimum of 90% recycled content compliant with AS 4454 (1999) and AS 4419 (1998). All trees marked as to be removed on the proposed development are to be chipped and reused for this purpose. Place mulch evenly and to a depth of 100mm.

8.5 Signage

Prior to works commencing, tree protection signage is to be attached to each tree protection zone, displayed in a prominent position and the sign repeated at 10 metres intervals or closer where the fence changes direction. Each sign shall contain in a clearly legible form, the following information:
Tree protection zone.

- This fence has been installed to prevent damage to the trees and their growing environment both above and below ground and access is restricted.
- No Access within Tree Protection Zone
- The name, address, and telephone number of the developer.

The name and telephone number of the Site Arborist.

9.0 Site Management Issues

9.1 Soil Compaction

Plant and pedestrian traffic during the construction period will cause significant soil compaction. This will be exacerbated by increased water expected on these soils as result of adjacent construction and weather. Compaction of the soil within the TPZ will reduce the voids between soil peds or particles therefore will reduce the gaseous exchange capacity of the root system which will slow critical metabolic processes such as respiration which produces Adenosine Triphosphate (ATP) which provides energy for the photosynthesis, which in turn provides photosynthates such as glucose. These photosynthates provide the carbohydrates required for tree extension growth, girth expansion, reproduction and pest and disease resistance. No pedestrian or plant access is permissible to the TPZ.

9.2 Site Access

Sufficient access is required to enable efficient construction. It is essential to delineate access zones or corridors which will provide suitable access without damaging the existing trees to be retained or causing compaction to the root zone.

9.3 Excavation within Tree Protection Area

No excavation is to be carried out within the TPZs of retained trees without the permission and supervision of the site arborist (AQF5)

9.4 Possible Contamination / Storage of Materials

The construction site will require the use of many chemicals and materials that are possible contaminants which if not managed will pose a risk to the existing trees. These possible contaminants include fuels, herbicides, solvents and the like. A site-specific Environmental Management Plan shall be provided, and this specific risk identified and addressed.

10.0 Tree Protection Measures During Construction

10.1 Maintenance of Pre-Construction Tree Protection Measures

The Pre-Construction Tree Protection Measures identified in 5.0 above are to be maintained in good and serviceable condition throughout the construction period.

10.2 Possible Contaminants

Do not store or otherwise place bulk materials and harmful materials under or near trees. Do not place spoil from excavations within the TPZs. Prevent wind-blown materials such as cement from harming trees. All possible contaminants are to be stored in a designated and appropriate area with secure chemical spill measures such as a bund in place.

10.3 Physical Damage

Prevent damage to tree. Do not attach stays, guys and the like to trees. No personnel, plant, machinery or materials are to be allowed within the tree protection fencing.

10.4 Compaction

No filling or compaction shall occur over tree roots zones within tree protection fenced areas. Where construction occurs close to or the TPZ of trees to be retained it shall be necessary to install protection to avoid compaction of the ground surface. This protection is to be planks supported clear of the ground fixed to scaffolding.

10.5 Trenching

No Trenching should be necessary within the TPZs or within tree protection fencing. No further trenching is to be carried out without the approval of the Superintendent. Should any further trenching be required within the TPZs identified, this work is to be carried out by hand and under the supervision of a qualified Arborist.

10.6 Irrigation/Watering

Contractor is to ensure that soil moisture levels are adequately maintained. Apply water at an appropriate rate suitable for the species during periods of little or no rainfall.

10.7 Site Sheds / Amenities/ Storage

Site sheds, site amenities, ablutions and site storage shall be in the area clear of all TPZ. Chemicals and potential contaminants are to be stored appropriately and this storage area is to be enclosed by a chemical spill bund to prevent the potential run off of contaminants in the event of a spillage or accident.

11.0 Site Arborist

Prior to the commencement of works on site, a Site Arborist is to be appointed to ensure that all of the requirements of this report and *AS4970-2009* are met. The Site Arborist is to hold qualifications equivalent to AQF Level 5 and be a member of an relevant accredited industry organisation with continuing professional development requirements.

12.0 Environmental / Heritage/ Legislative Considerations

None of the subject trees are identified as threatened species or elements of endangered ecological communities within the Threatened Species Conservation Act 1995.

13.0 References

Mattheck, C. Breloer, K. 1993, The Body Language of Trees: A Handbook for Failure Analysis, 12th Impression 2010 The Stationery Office.
AS4970-2009 Protection of Trees on Development Sites : Standards Australia
Matheny, N. Clark, J. 1998, Trees and Development – A Technical Guide to Preservation of Trees During Land Development, 1998. International Society of Arboriculture

14.0 Disclaimer

This Appraisal has been prepared for the exclusive use of the Client and Birds Tree Consultancy.
Birds Tree Consultancy accepts no responsibility for its use by other persons. The Client acknowledges that this Appraisal, and any opinions, advice or recommendations expressed or given in it, are based on the information supplied by the Client and on the data inspections, measurements and analysis carried out or obtained Birds Tree Consultancy and referred to in the Appraisal. The Client should rely on the Appraisal, and on its contents, only to that extent.

Every effort has been made in this report to include, assess and address all defects, structural weaknesses, instabilities and the like of the subject trees. All inspections were made from ground level using only visual means and no intrusive or destructive means of inspection were used. For many structural defects such as decay and inclusions, internal inspection is required by means of Resistograph or similar. No such investigation has been made in this case. Trees are living organisms and are subject to failure through a variety of causes not able to be identified by means of this inspection and report.

Appendix A Landscape Significance

IACA Significance of a Tree, Assessment Rating System (STARS) © (IACA 2010)©

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd in June 2001.

The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. However, rating the significance of a tree becomes subjective and difficult to ascertain in a consistent and repetitive fashion due to assessor bias. It is therefore necessary to have a rating system utilising structured qualitative criteria to assist in determining the retention value for a tree. To assist this process all definitions for terms used in the *Tree Significance - Assessment Criteria* and *Tree Retention Value - Priority Matrix*, are taken from the IACA Dictionary for Managing Trees in Urban Environments 2009.

This rating system will assist in the planning processes for proposed works, above and below ground where trees are to be retained on or adjacent a development site. The system uses a scale of *High*, *Medium* and *Low* significance in the landscape. Once the landscape significance of an individual tree has been defined, the retention value can be determined.

Tree Significance - Assessment Criteria

1. High Significance in landscape

- The tree is in good condition and good vigour;
- The tree has a form typical for the species;
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age;
- The tree is listed as a Heritage Item, Threatened Species or part of an Endangered ecological community or listed on Councils significant Tree Register;
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity;
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values;
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa *in situ* - tree is appropriate to the site conditions.

2. Medium Significance in landscape

- The tree is in fair-good condition and good or low vigour;
- The tree has form typical or atypical of the species;
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street,
- The tree provides a fair contribution to the visual character and amenity of the local area,
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa *in situ*.

3. Low Significance in landscape

- The tree is in fair-poor condition and good or low vigour;
- The tree has form atypical of the species;
- The tree is not visible or is partly visible from surrounding properties as obstructed by other vegetation or buildings,
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area,
- The tree is a young specimen which may or may not have reached dimension to be protected by local Tree Preservation orders or similar protection mechanisms and can easily be replaced with a suitable specimen,
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa *in situ* - tree is inappropriate to the site conditions,
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms,
- The tree has a wound or defect that has potential to become structurally unsound.

Environmental Pest / Noxious Weed Species

- The tree is an Environmental Pest Species due to its invasiveness or poisonous/ allergenic properties,
- The tree is a declared noxious weed by legislation.

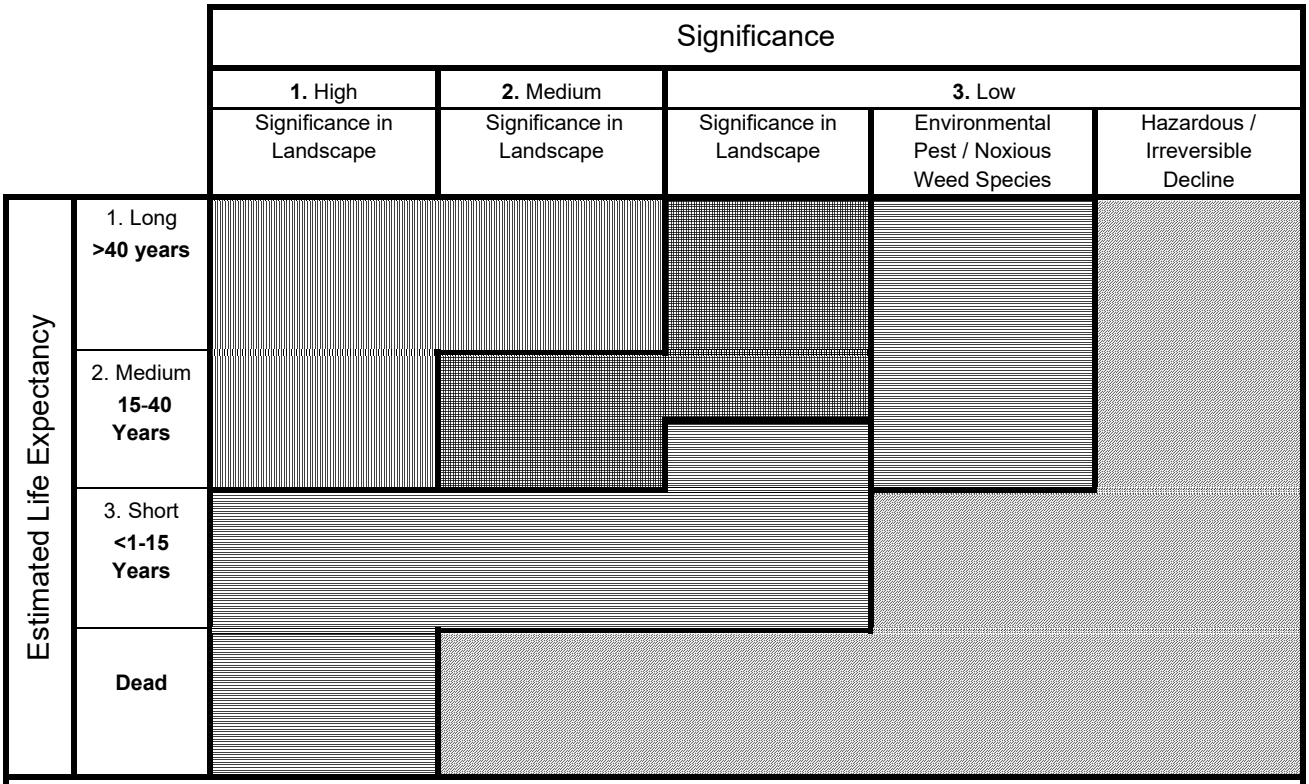
Hazardous/Irreversible Decline

- The tree is structurally unsound and/or unstable and is considered potentially dangerous,
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

Note: The assessment criteria are for individual trees only, however, can be applied to a monocultural stand in its entirety e.g. hedge.

Appendix B Tree Retention Values



Legend for Matrix Assessment

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

REFERENCES

Australia ICOMOS Inc. 1999, *The Burra Charter – The Australian ICOMOS Charter for Places of Cultural Significance*, International Council of Monuments and Sites, www.icomos.org/australia

Draper BD and Richards PA 2009, *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.

Footprint Green Pty Ltd 2001, *Footprint Green Tree Significance & Retention Value Matrix*, Avalon, NSW Australia, www.footprintgreen.com.au

Appendix C - Tree Inspection Data

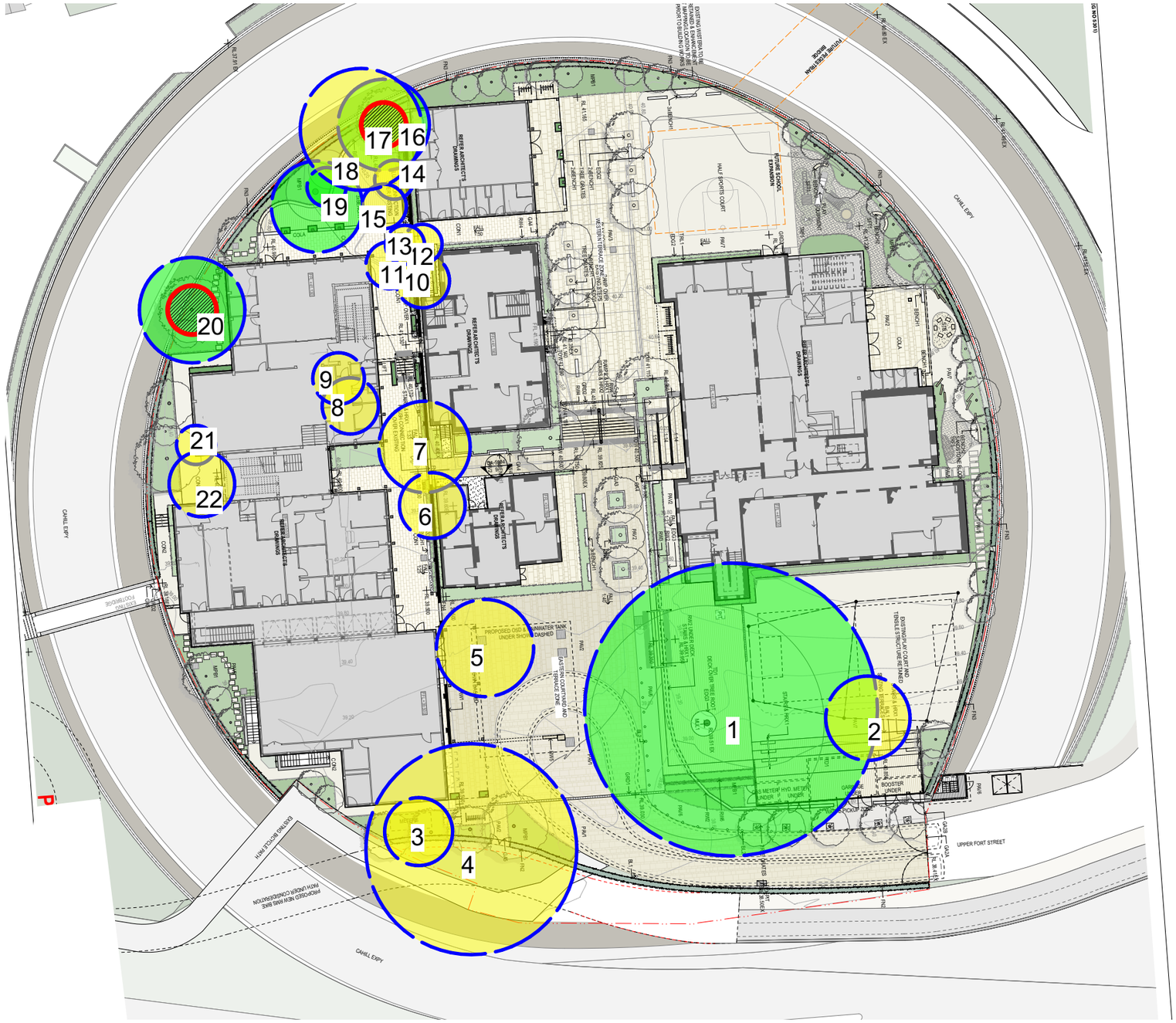
Birds Tree Consultancy

Consulting Arborist• Project Management • Horticultural Consultancy • Landscape Management

Inspection Data 4-Apr-19
Fort Street Public School

Tree no.	Species	Height (m)	Spread(m)	DBH (mm)	TPZ radius (m)	Dia at base	SRZ Radius (m)	Maturity	Trunk (single, twin, multiple @)	Trunk lean	Form/Crown shape	Branching Habit	Crown Distribution	Stability	Branching Structure	Pruning History	Defects	Damage	Overall Health & Vigour	Canopy Density	Foliage	Deadwood	Epicormic Growth	Pest Infestation	Disease	Life expectancy	Env. & Landcape significance	Retention Value	Notes/Comments
1	Ficus macrophylla	21	24	1750	15	2000	4.4	Mature	Single	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Evidence of decay	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	High	High	Decay in primary branch on eastern side at point of high lever arm stress 1.5m from junction in long horizontal end weighted branch. Decay in secondary branch on northern side of canopy
2	Lophostemon confertus	7	6	360	4.32	400	2.3	Mature	Single	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	High	High	Located within timber decking
3	Eucalyptus robusta	14	7	290	3.48	340	2.1	Mature	Single	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Fair	Thinning	Chlorotic	10%	40%	Lerps	No evidence	15-40y	Moderate	Medium	Significant lerp infestation
4	Eucalyptus tereticornis	16	12	900	10.8	1000	3.3	Mature	Single	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Fair	Thinning	Normal	20%	40%	No evidence	No evidence	5-15y	High	High	Significant apical dieback. Declining
5	Schinus terebinthifolius	7	10	415	4.98	490	2.5	Mature	Multiple (3) @ base	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	Low	Low	
6	Murraya paniculata	6	7	280	3.36	300	2.0	Mature	Multiple @ base	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	Low	Low	Immediately adjacent to wall
7	Banksia integrifolia	12	7	390	4.68	420	2.3	Mature	Single	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	High	High	
8	Callistemon viminalis	5	3	240	2.88	280	1.9	Mature	Multiple @ base	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	Moderate	Medium	
9	Callistemon viminalis	5	4	220	2.64	260	1.9	Mature	Multiple @ base	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	Moderate	Medium	
10	Hakea salicifolia	7	4	230	2.76	290	2.0	Mature	Single	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Poor	Sparse	Normal	<5%	<5%	No evidence	No evidence	5-15y	Moderate	Medium	Poor and declining condition.
11	Callistemon viminalis	7.5	6	200	2.4	250	1.8	Mature	Multiple (3) @ base	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	Moderate	Medium	
12	Citharexylum spinosum	10	4	130	2	160	1.5	Mature	Single	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	Moderate	Medium	
13	Callistemon viminalis	8	4	120	2	180	1.6	Mature	Single	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	Moderate	Medium	
14	Acmena smithii	9	4	105	2	120	1.4	Mature	Single	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Fair	Thinning	Normal	<5%	<5%	No evidence	No evidence	15-40y	High	High	
15	Angophora floribunda	9	6	190	2.28	220	1.8	Mature	Single	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Failed leader	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	Low	Low	
16	Jacaranda mimosifolia	9	7	390	4.68	420	2.3	Mature	Single	Slight N	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	High	High	
17	Celtis sinensis	13	11	520	6.24	580	2.6	Mature	Twin @ base	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	Low	Low	
18	Eucalyptus piperita	7	4	120	2	180	1.6	Mature	Single	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	Moderate	High	
19	Eucalyptus saligna	16	12	390	4.68	440	2.3	Mature	Single	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	High	High	
20	Ulmus parvifolia	12	13	450	5.4	490	2.5	Mature	Twin @ 1m	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	Moderate	Medium	Immediately adjacent to retaining wall
21	Acmena smithii	10	4	150	2	180	1.6	Mature	Single	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	Moderate	Medium	Immediately adjacent to existing building
22	Acmena smithii	10	5	280	3.36	320	2.1	Mature	Twin @ base	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	Moderate	Medium	Immediately adjacent to existing building

Appendix D Tree Protection Plans



Legend

- **Tree to be retained**
- **Tree not viable to be retained due to Development Impact**
- **Tree to be Removed**
- **Tree Protection Zone (TPZ) in accordance with AS4970-2009**
- **Structural Root Zone (SRZ) in accordance with AS4970-2009**

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Project: Fort Street Public School
Client: School Infrastructure NSW
DWG: A01 REV F
Plan: Tree Location Plan
Date: 25 Jan 2020 Scale : 1:500 @ A3

Appendix E Resistograph Test

Birds Tree Consultancy

Consulting Arborist AQF5/AQF8 • Expert Witness • Environmental Arboriculture •Resistograph Testing

Fort Street Public School

RESISTOGRAPH TEST REPORT

29th October 2020

Prepared for
Lend Lease

Prepared by

Birds Tree Consultancy
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MEMBER OF INSTITUTE OF AUSTRALIAN CONSULTING ARBORICULTURISTS

Executive Summary

This Resistograph Test Report has been commissioned by Lend Lease to test and report on one tree at two branches that have defects that have been identified in Birds Tree Consultancy Arboricultural Development Impact Assessment Report Revision E dated 18 September 2020 as showing evidence of significant structural defects which may increase the risk of failure of these tree and that requires further investigation by means of Resistograph testing. This Resistograph Testing Report is to be read in conjunction with this previous report.

The extent of the structural defects within the subject trees as determined by Resistograph Testing is defined within Section 5.0. The corresponding risk posed by the presence of thee structural defects is outlined within the Risk Assessment in Section 6.0.

Tree 1 is found to have a moderate risk rating for failure of the branch at Location 1 and accordingly poses a significant hazard to life. In order to remove the risk posed by this branch, we recommend the removal of this branch at the secondary junction.

Tree 1 is found to have a moderate risk rating for failure of the branch at Location 1 and accordingly poses a significant hazard to life. In order to remove the risk posed by this branch, we recommend the removal of this branch at the secondary junction.

All pruning is to be carried out by qualified arborists with minimum qualifications AQF Level 3 and is to be carried out strictly in accordance with *AS4373-2007 Pruning of Amenity Trees.*

We recommend that this tree be monitored regularly and re-tested annually.

Contents

1.0 Scope of Works

This Resistograph Test Report has been commissioned by Lend Lease to test and report on one tree at two branches that have defects that have been identified in Birds Tree Consultancy Arboricultural Development Impact Assessment Report Revision E dated 18 September 2020 as showing evidence of significant structural defects which may increase the risk of failure of these tree and that requires further investigation by means of Resistograph testing. This Resistograph Testing Report is to be read in conjunction with this previous report.

On 29th September 2020, Glenn Bird of Birds Tree Consultancy attended site and inspected the subject tree from the ground and aerially. Testing was carried out using an IML Resi F500-S Resistograph.

2.0 Site Analysis

2.1 Site

The subject site is Fort Street Public School. The subject tree is located adjacent to existing timber decking area of the school. The subject tree is noted as Tree 1 within Birds Tree Consultancy Arboricultural Development Impact Assessment Report Revision E dated 18 September 2020. Tree 1 is in close proximity to student play areas.

2.2 Identification

Tree numbering has been retained from Birds Tree Consultancy Arboricultural Development Impact Assessment Report Revision E dated 18 September 2020. The subject Tree is identified as Tree 1 in this previous report as well as Figure 1.

Figure 1 - Tree Location

3.0 Existing Tree

The following tree was inspected from the ground and aerially and the following items identified.

3.1 Tree 1 *Ficus macrophylla*

This tree has been assessed by Birds Tree Consultancy and a potential structural defect identified at two locations within the canopy, which requires additional investigation by means of Resistograph Testing.

This mature tree is approximately 21m tall with a canopy spread of 24m. It has a single trunk with a diameter at breast height (DBH) of 1750mm. This tree is in good health and condition with minimal deadwood and epicormic growth. There is evidence of decay in a secondary junction on the eastern side at point of high lever arm stress 1.5m from junction in long horizontal end weighted branch at a height of approximately 3m. There is also decay in a secondary branch on the northern side of canopy, approximately 1.5m from the secondary junction at a height of approximately 9m.

Figure 2 - Decay at Location 1

Figure 3 - Decay at Location 2

4.0 Resistograph Test

Birds Tree Consultancy carried out Resistograph testing of the subject tree using an IML Resi F500-S Resistograph. This testing involves the penetration of a 3mm probe through the tree to a maximum depth of 500mm with the resistance to the probe measured in order to determine the internal strength and structural integrity of the tree. This resistance is plotted on a graph showing the relative resistance to the probe. Please refer to Appendix A for Resistograph Data.

The testing of this tree was targeted specifically to determine the presence of decay, cavities or other significant structural defects within the trunk and is based on evidence determined from Visual Tree Assessment as well as from determinations of Birds Tree Consultancy reports It is important to note that the Resistograph probe can measure to a depth of 500mm however where the trunk diameter at the point of testing is greater than 500mm test locations and directions have been chosen to accommodate the testing depth.

4.1 Test Locations

Test locations were specifically selected to test issues identified by Birds Tree Consultancy. Test locations were selected with the intention of determining whether there is any decay or degradation related to visible evidence.

4.2 Test 1

Test 1 was carried out on Tree 1 at location 1, on the eastern side of the canopy at height of approximately 3000mm from the underside of the branch. This test identifies a narrow wall of sound wood for the first 40mm before encountering a central section of decay and incipient wood before passing through a narrow section of sound wood wall on the other side of the test.

4.3 Test 2

Test 2 was carried out on Tree 1 at location 2 at a height of approximately 9000mm on the northern side of the trunk. This test identifies sound wood for the first 55mm before encountering decay for 220mm before encountering a sound wood wall of 55mm.

5.0 Results / Analysis

Results of Test 1 in section 4 show that Tree 1 has extensive decay and incipient wood at location 1. This area of the branch at location 1 is shown in test result 1 to have sound wall thickness of 40mm with the majority of the branch junction decay or incipient wood. This represents a minimum ratio of sound wall to trunk radius ratio of 0.27 which is less than 0.40 which reliably indicates a significantly increased risk of trunk failure. When a tree has a ratio of sound wall thickness to trunk or branch radius equal to or less than 0.3-0.4, the likelihood of a predictable trunk or branch failure increases significantly (Mattheck & Breloer, 1994, Page 103). This risk of failure is exacerbated by the fact that there is an open wound which leaves the defect prone to failure by means of “hose pipe kinking” (Mattheck & Breloer, 1994, Page 121, 195). This decayed junction is at high lever arm stress due to the angle of the junction and the horizontal end weighted secondary branch.

Results of Test 2 in section 4 show that Tree 1 has extensive decay at location 2. This area of the branch at location 1 is shown in test result 1 to have sound wall thickness of 55mm with the centre of the branch containing decayed wood. This represents a minimum ratio of sound wall to trunk radius ratio of 0.33 which is less than 0.40 which reliably indicates a significantly increased risk of trunk failure. When a tree has a ratio of sound wall thickness to trunk or branch radius equal to or less than 0.3-0.4, the likelihood of a predictable trunk or branch failure increases significantly (Mattheck & Breloer, 1994, Page 103). This risk of failure is exacerbated by the fact that there is an open wound which leaves the defect prone to failure by means of “hose pipe kinking” (Mattheck & Breloer, 1994, Page 121, 195).

6.0 Risk Assessment

The subject trees have a number of structural defects as outlined in Section 5 above. This places this tree at increased risk of failure.

This Arboricultural Risk Assessment is made in accordance with the International Society of Arboriculture (ISA) Tree Risk Assessment guidelines. The time frame of this Risk Assessment is 5 years.

The following factors were compiled as part of this assessment:

1. Presence of structural defects, and decay within subject trees.

From this assessment we determine that Tree 1 is at increased risk of failure at points of structural defects.

Target Analysis

The subject tree is near existing play facilities and pedestrian accessways within a school, potentially posing a hazard to people.

Risk Analysis

Likelihood of Failure	Likelihood of Impact			
	Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Table 1 - Likelihood Matrix

Likelihood of Failure & Impact	Consequences of Failure			
	Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Table 2 - Risk Rating Matrix

Tree no	Target	Tree Part	Condition of Concern	Likelihood			Consequence	Risk Rating (Table 2)
				Failure	Impact	Failure & Impact (table 1)		
1	People,	Branch at Location 1	Decay	Possible	High	Somewhat likely	Severe	Moderate
1	People,	Branch at Location 2	Decay	Possible	High	Somewhat likely	Severe	Moderate

Table 3 - Risk Categorisation

7.0 Recommendations

The extent of the structural defects within the subject trees as determined by Resistograph Testing is defined within Section 5.0. The corresponding risk posed by the presence of thee structural defects is outlined within the Risk Assessment in Section 6.0.

Tree 1 is found to have a moderate risk rating for failure of the branch at Location 1 and accordingly poses a significant hazard to life. In order to remove the risk posed by this branch, we recommend the removal of this branch at the secondary junction.

Tree 1 is found to have a moderate risk rating for failure of the branch at Location 1 and accordingly poses a significant hazard to life. In order to remove the risk posed by this branch, we recommend the removal of this branch at the secondary junction.

All pruning is to be carried out by qualified arborists with minimum qualifications AQF Level 3 and is to be carried out strictly in accordance with *AS4373-2007 Pruning of Amenity Trees.*

8.0 References

Mattheck, C. Breloer, K. 1993, The Body Language of Trees: A Handbook for Failure Analysis, 12th Impression 2010 The Stationery Office.

9.0 Disclaimer

This Appraisal has been prepared for the exclusive use of the Client and Birds Tree Consultancy.

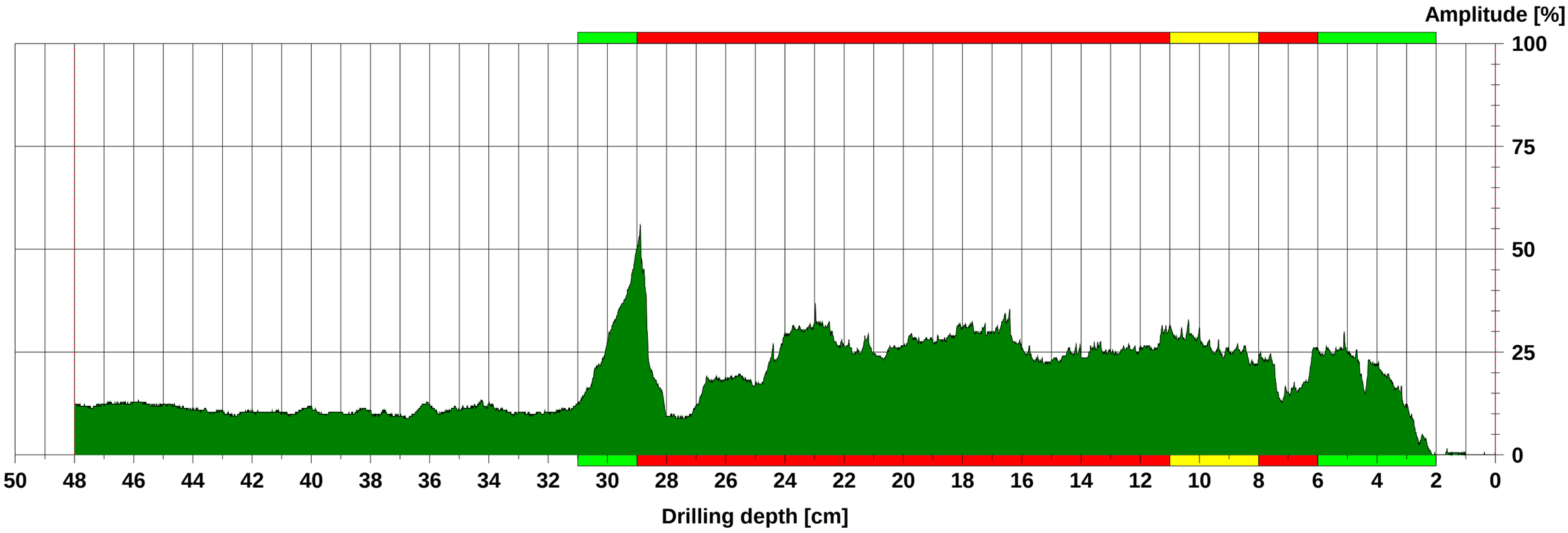
Birds Tree Consultancy accepts no responsibility for its use by other persons. The Client acknowledges that this Appraisal, and any opinions, advice or recommendations expressed or given in it, are based on the information supplied by the Client and on the data inspections, measurements and analysis carried out or obtained Birds Tree Consultancy and referred to in the Appraisal. The Client should rely on the Appraisal, and on its contents, only to that extent.

Every effort has been made in this report to include, assess and address all defects, structural weaknesses, instabilities and the like of the subject trees. All inspections were made from ground level using only visual means and no intrusive or destructive means of inspection were used. For many structural defects such as decay and inclusions, internal inspection is required by means of Resistograph or similar. No such investigation has been made in this case. Trees are living organisms and are subject to failure through a variety of causes not able to be identified by means of this inspection and report.

Appendix A – Resistograph Data

Measuring / object data

Measurement no.	: 1	**Tilt**	: ---	**Name**	: Birds Tree Consltncy
Drilling depth	: 47.99 cm	**Avg. curve**	: off		
Wood species	: Soft (1)	**Diameter**	: 29.0 cm		
ID number	: 00000 0 2	**Level**	: 280.0 cm		
Date	: 26.09.2020	**Direction**	: From underside		
Time	: 10:53:05	**Object species**	: Ficus macrophylla		
Advance	: 49 cm/min	**Location**	: FSPS		



Assessment

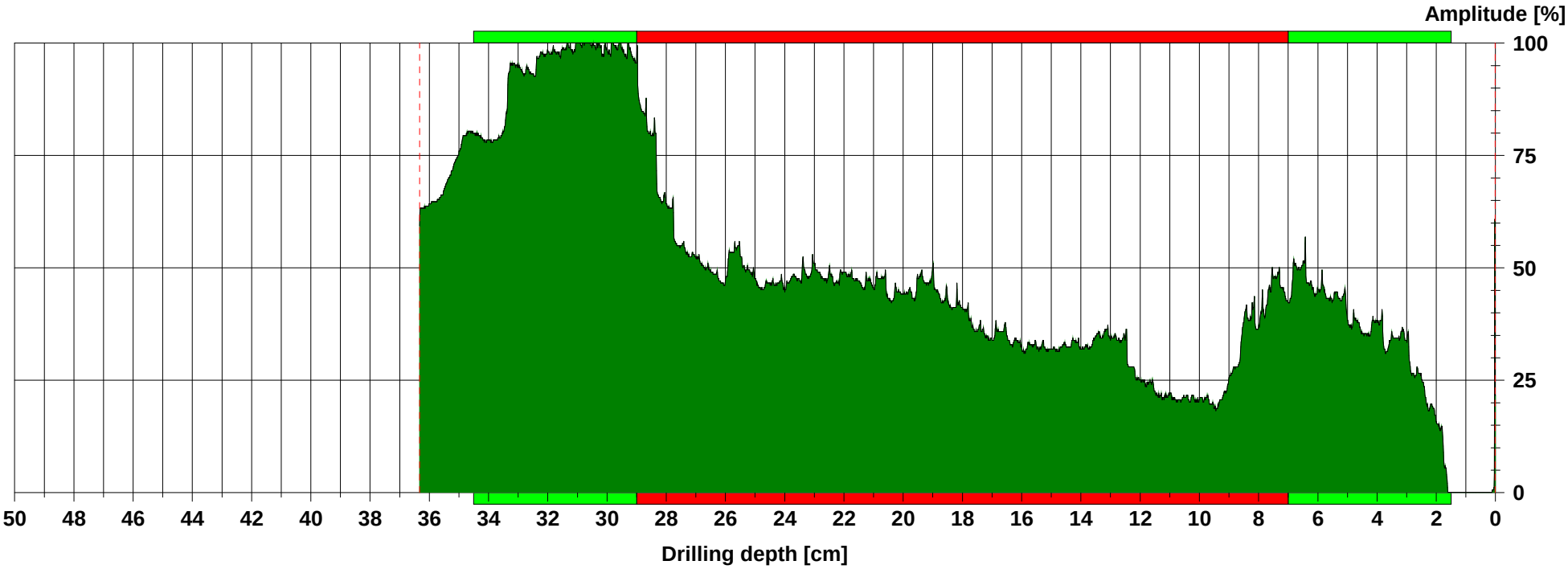
From	2.0 cm	**to**	6.0 cm	:	Sound wood
From	6.0 cm	**to**	8.0 cm	:	Decay/Cavity
From	8.0 cm	**to**	11.0 cm	:	Incipient wood
From	11.0 cm	**to**	29.0 cm	:	Decay/Cavity
From	29.0 cm	**to**	31.0 cm	:	Sound wood
From	0.0 cm	**to**	0.0 cm	:	

Comment

Narrow sound wood walls of 40mm and 10mm with majority decayed and incipient wood centrally

Measuring / object data

Measurement no.	: 2	**Tilt**	: ---	**Name**	: Birds Tree Cnsltncy
Drilling depth	: 36.33 cm	**Avg. curve**	: off		
Wood species	: Soft (1)	**Diameter**	: 33.0 cm		
ID number	: 00000 0 2	**Level**	: 900.0 cm		
Date	: 26.09.2020	**Direction**	: Underside		
Time	: 10:37:44	**Object species**	: Ficus macrophylla		
Advance	: 48 cm/min	**Location**	: FSPS		



Assessment

From	1.5 cm	**to**	7.0 cm	:	Sound wood
From	7.0 cm	**to**	29.0 cm	:	Decay/Cavity
From	29.0 cm	**to**	34.5 cm	:	Sound wood
From	34.5 cm	**to**	0.0 cm	:	
From	0.0 cm	**to**	0.0 cm	:	
From	0.0 cm	**to**	0.0 cm	:	

Comment

Sound wall thicknesses of 55mm on both sides of the branch with decay central. Open wound.

Appendix F Pruning Specification

Birds Tree Consultancy

Consulting Arborist AQF5/AQF 8• Expert Witness • Environmental Arboriculture • Resistograph Testing

PRUNING SPECIFICATION

Fort Street Public School NSW

REVISION A
11 December 2020

Prepared for
Lend Lease

Prepared by

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Contents

1.0 Scope of Works

This Pruning Specification has been commissioned by Lend Lease to provide specification for pruning requirements to resolve the potential impact of the proposed construction traffic on Tree 1 at Fort Street Public School as defined in Birds Tree Consultancy Development Impact Assessment Report dated 18 September 2020. It has been commissioned to outline the pruning requirements to allow construction traffic including cranes to travel below the canopy without impacting this tree.

On the 11 November September 2020, Glenn Bird of Birds Tree Consultancy attended site and inspected the subject tree from the ground.

2.0 Site Analysis

2.1 Site

The subject site is Fort Street Public School, Observatory Hill, Upper Fort Street Sydney, NSW. This site is currently undergoing development involving the construction of new school buildings. The subject tree has been included within Birds Tree Consultancy Development Impact Assessment Report dated 18 September 2020. proposed construction. Vehicle traffic routes/access to and from the site will impact on lower branches on the eastern side of the canopy. In order to prevent damage to the canopy during Construction, crown reduction pruning is required.

2.2 Identification

The subject tree is Tree 1 as defined by Birds Tree Consultancy Development Impact Assessment Report dated 18 September 2020.

3.0 Existing Trees

3.1 *Tree 1 - Ficus macrophylla*

This mature tree is approximately 21m tall with a canopy spread of 24m. It has a single trunk with a diameter at breast height (DBH) of 1750mm. This tree is in good health and condition with minimal deadwood and epicormic growth. This tree has a number of long horizontal end weighted branches and the canopy extends to the east over the adjacent Upper Fort Street roadway. Clearance of 4.2m is required to allow for construction vehicular access under the canopy on the eastern side of the canopy.

Figure 1 - Canopy overhanging Upper Fort Street.

4.0 Pruning Specification

4.1 Tree 1

Selective pruning is required to provide canopy clearance of 4.2m for construction vehicular access. Three tertiary branches are required to be removed as shown in Figures 2, 3 and 4. Branches are required to be removed to provide free clearance of 4.2m. All pruning is to be carried out under the supervision of the Site Arborist (AQF Level 5) by an arborist with qualifications of AQF Level 3 or higher. All pruning is to be in accordance with *AS4373-2007 Pruning of Amenity Trees.*

Pruning Location A is a tertiary branch with a diameter at the pruning location of approximately 75mm. This branch extends in an easterly direction. This branch is to be pruned at the tertiary branch junction at the branch collar at the location shown in figure 2.

Figure 2 - Pruning Location A

Pruning Location B is a tertiary branch with a diameter at the pruning location of approximately 75mm. This branch extends in an easterly direction. This branch is to be pruned at the tertiary branch junction at the branch collar at the location shown in figure 3.

Figure 3 - Pruning Location B

Pruning Location C is a tertiary branch with a diameter at the pruning location of approximately 75mm. This branch extends in an easterly direction. This branch is to be pruned at the tertiary branch junction at the branch collar at the location shown in figure3.

Figure 4 - Pruning Location C