ARBORICULTURAL ASSESSMENT AND DEVELOPMENT IMPACT REPORT

FORMER RACHEL FORSTER HOSPITAL SITE
134-144 PITT STREET
REDFERN

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CONTENTS

1. BACKGROUND

Landscape Matrix Pty Ltd has been engaged by the Redfern Waterloo Authority to prepare an Arboricultural report in respect to trees on or adjacent to the former Rachel Forster Hospital Site in Pitt Street at Redfern. The report discusses those trees proposed to be removed in the part 3A Concept Application for the redevelopment of the site for residential apartments and open space. The report also identifies trees that may be potentially affected by the proposed development, and makes recommendations with regard to other trees based on their species and condition. This report has been prepared by Guy Paroissien a Director of Landscape Matrix.

The site was inspected on 1 May 2007. The assessment of the trees is based upon a visual inspection of the trees from ground level using the Visual Tree Assessment (VTA) approach developed by Mattheck & Breloer (1994). The inspection was limited to visual inspection of the trees without dissection, probing or coring. No aerial inspection of the trees was carried out and the assessment did not include any woody tissue testing or root investigation.

The tree heights and canopy spreads were estimated and expressed in metres and the tree diameters at breast height (DBH) were measured with a standard metal tape at approximately 1.4 metres above ground level and expressed in millimetres.

Photographs of a number of the trees are included in Appendix A of this report to illustrate various issues relating to these trees.

2. TREES ON SITE

19 individual trees or groups of trees on the site and adjoining properties have been assessed in preparing this report. A summary of these trees, their dimensions, condition, Safe Use and Life Expectancy (SULE) and landscape significance is attached in Appendix B. The SULE categories identified throughout the report and in Appendix B follow those of Barrell (1996).

The tree numbers in this report correspond with those marked on the attached Survey Plan prepared by Michael Lockley and Associates Pty Ltd, Consulting Surveyors, dated 10/9/03, Reference Number 27216 (as updated by Landscape Matrix on 17 May 2007). A copy of the updated survey with tree numbers is included as Appendix C. Tree numbers 2, 7, 8 and 12 have been added to the survey by Landscape matrix and are approximate locations only (not to survey).

The site supports a range of planted Australian and exotic canopy species. The understorey areas of the site have been developed in the past as garden/landscape areas and those areas at the front of the site appear to be maintained on a regular basis. This area at the Pitt Street frontage contains the most significant vegetation on the site.

The areas at the rear of the site do not appear to have been maintained on a regular basis in the recent past and are now dominated by weed species together with occasional exotic shrubs in planter areas.

The site is located in the Local Government Area of Sydney City Council.

The trees that have been assessed on the site and adjoining properties are summarised in table 1 as follows:

Table 1: Summary of trees assessed at the Former Rachel Forster Hospital Site

Tree No.	Genus, species and Common Name	Maturity and Dimensions	Health and vigour	Comments
1	*Celtis sinense* (Chinese Hackberry)	A mature, multi trunked specimen approximately 11 metres high with a canopy spread of 10 metres and DBH of 85 to 165mm	Good health, fair vigour	The tree displays signs of instability with multiple trunks from ground level and with evidence of poor attachment at the trunk junctions (included bark in junctions) - the junctions of the trunks are weak points in the tree's structure with increased risk of failure. Numerous structural roots from the tree are exposed in the vicinity of the trunk. Of moderate landscape significance.
2	*Ligustrum sinense* (Small-leaved Privet)	A mature, multi trunked specimen approximately 5 metres high with a canopy spread of 4 metres and DBH up to 50mm	Good health, fair vigour	The tree has been incorrectly pruned ('lopped') at 1.3 metres - the resulting regrowth is poorly attached with increased risk of failure. This species is an environmental weed - removal and replacement recommended. An environmental pest species.

Tree No.	Genus, species and Common Name	Maturity and Dimensions	Health and vigour	Comments
3	*Lophostemon confertus* (Brushbox)	A mature, single trunked specimen approximately 18 metres high with a canopy spread of 11 metres and a DBH of 635mm (averaged from 580 x 740mm).	Good health, fair vigour	At the time of inspection the tree exhibited low to moderate levels of dieback. The tree displays signs of instability with 2 codominant trunks from 2.3 metres - while appearing sound at the time of inspection the junction of the trunks is a weak point in the tree's structure with increased risk of failure. In addition there is evidence of past termite activity in the tree with termite leads (mudding) in the tree's lower trunk bark - the presence of reaction wood in the lower trunk indicated there may be internal damage in the trunk, possibly from the past termite activity - it is recommended further testing such as Picus Sonic Tomograph® or Resistograph® testing be undertaken to provide an accurate assessment of the tree's structural integrity. This further testing should be undertaken at the project application stage. Of high Landscape significance.
4	*Lophostemon confertus* (Brushbox)	A mature, single trunked specimen approximately 9 metres high with a canopy spread of 8 metres and a DBH of 405mm (averaged from 380 x 430mm).	Good health, fair vigour	At the time of inspection the tree exhibited low to moderate levels of dieback and reduced foliage density in the upper canopy. The tree develops codominant trunks from 1.7 metres - while appearing sound at the time of inspection the junction of the trunks is a weak point in the tree's structure with increased risk of failure. Of moderate to high landscape significance.
5	*Cinnamomum camphora* (Camphor laurel)	A mature, single trunked specimen approximately 14 metres high with a canopy spread of 8 x 14 metres and a DBH of 750mm (averaged from 720 x 780mm).	Poor health, poor vigour	At the time of inspection the tree exhibited very high levels of dieback and deadwood and high levels of epicormic growth on the scaffold branches. The tree is in decline with a very short predicted SULE. (< 5 years) There is increased risk of branch fall with large diameter deadwood present in the upper canopy. Removal and replacement with a suitable species is recommended. Of moderate landscape significance.

Tree No.	Genus, species and Common Name	Maturity and Dimensions	Health and vigour	Comments
6	*Cinnamomum camphora* (Camphor laurel)	An over mature, multi trunked specimen approximately 16 metres high with a canopy spread of 19 x 16 metres and DBH of 460, 540, 610, 670 and 850mm.	Moderate health, poor vigour	The tree displays signs of instability with multiple trunks from approx 1 metre and evidence of included bark in the junctions. There is a seedling *Ficus sp*. (Fig) and seedling *Exocarpos cupressiformis* (Native Cherry) growing in a trunk junction on the NE and SW sides at approx 1 metre indicative of deep inclusion. There is a hollow in a trunk at 3 metres on the western side that requires further investigation to determine structural integrity. At the time of inspection the tree exhibited high levels of dieback and very high levels of epicormic growth indicative of decline. The tree is in the initial stages of decline with a short predicted SULE (5 to 15 years). Significant in the landscape.
7	*Camellia sasanqua* (Chinese Camellia)	A row of 10 semi mature specimens approximately 2 to 4 metres in height with canopy spreads of 1 to 2 metres and DBH of 30 to 85mm.	Moderate health, poor vigour	A row of 10 semi mature specimens in moderate health, of poor vigour and of low landscape significance - moderate to high levels of dieback present. Of low landscape significance.
8	*Camellia sasanqua* (Chinese Camellia)	A row of 12 semi mature specimens approximately 4 to 4.5 metres in height with canopy spreads of 1.8 to 4 metres and DBH of 25 to 90mm.	Good health, good vigour	A row of 12 semi mature specimens in good health but of low landscape significance. Of low landscape significance.

Tree No.	Genus, species and Common Name	Maturity and Dimensions	Health and vigour	Comments
9	*Liriodendron tulipifera* (Tulip Tree)	A mature, single trunked specimen approximately 18 metres high with a canopy spread of 9 metres and a DBH of 640mm	Moderate health, poor vigour	The tree displays signs of instability/structural problems with possible decay in a torn pruning stub at 8 metres on the NW side and branch junctions in the mid to upper canopy - an aerial inspection of these areas is recommended to assess potential impacts on the tree's structural integrity. At the time of inspection the tree exhibited high levels of dieback - it is recommended the tree be re-inspected in the future when the tree is in full leaf to re-assess the tree's vigour. The tree is in the initial stages of decline with a short predicted SULE (5 to 15 years). Of high Landscape significance.
10	*Syzigium luehmannii* (Small-leaved Lilli Pilli)	A mature, multi trunked specimen approximately 8 metres high with a canopy spread of 6 metres and DBH of 150, 170 and 200mm.	Moderate health, fair vigour	The tree displays signs of instability with 2 codominant trunks from 0.8 metres and 3 trunks at 1.4 metres - while appearing sound at the time of inspection the junctions of the trunks are weak points in the tree's structure with increased risk of failure. At the time of inspection the tree exhibited reduced foliage density in the upper canopy and moderate levels of dieback. Of moderate landscape significance.
11	*Lophostemon confertus* (Brushbox)	A mature, single trunked specimen approximately 15 metres high with a canopy spread of 10 metres and a DBH of 630mm (averaged from 600 x 660mm).	Good health, fair vigour	At the time of inspection the tree exhibited moderate levels of dieback and epicormic growth. The tree forms codominant trunks at 2.3 metres - while appearing sound at the time of inspection the junctions of the trunks is a weak point in the tree's structure with increased risk of failure - recommended the junction be monitored to check structural integrity if a future proposal was to provide for retention of this tree. Of high Landscape significance.

Tree No.	Genus, species and Common Name	Maturity and Dimensions	Health and vigour	Comments
12	*Celtis sinense* (Chinese Hackberry)	A semi mature, single trunked specimen approximately 14 metres high with a canopy spread of 6 metres and a diameter at breast height (DBH) of 240mm	Good health, good vigour	The tree displays signs of instability with an exposed root plate and limited root growth on the north side of the trunk due to its immediate proximity to the building on its north side - the risk of failure will increase as the tree's canopy increases in dimension. Of moderate landscape significance.
13	*Celtis sinense* (Chinese Hackberry)	A semi mature, single trunked specimen approximately 14 metres high with a canopy spread of 7 metres and a DBH of 300mm	Good health, good vigour	The tree forms codominant trunks at 3 metres - while appearing sound at the time of inspection the junctions of the trunks is a weak point in the tree's structure with increased risk of failure - recommended the junction be monitored to check structural integrity if a future proposal was to provide for retention of this tree. Of high Landscape significance.
14	*Jacaranda mimosifolia* (Jacaranda)	A mature to over mature, single trunked specimen approximately 12 metres high with a canopy spread of 16 metres and a DBH of 890mm (averaged from 840 x 940mm).	Good health, fair vigour	The tree displays signs of instability with codominant trunks from 1.4 metres with potential for decay in an upward facing depression on the top side of the junction - while appearing sound at the time of inspection the junctions of the trunks is a weak point in the tree's structure with increased risk of failure - recommended the junction be monitored to check structural integrity if a future proposal was to provide for retention of this tree. Pruning stubs need to be investigated for potential decay. There is a split hazard beam at approx 8.5 metres on the south side of the canopy that requires removal. A number of self sown Celtis sinense growing in close proximity to the tree require removal. Of high Landscape significance to significant in the landscape.

Tree No.	Genus, species and Common Name	Maturity and Dimensions	Health and vigour	Comments
15	*Plumeria rubra* (Frangipani)	A mature to over mature, multi trunked specimen approximately 6 metres high with a canopy spread of 5 x 7 metres and DBH of 120 to 210	Good health, fair vigour	The tree forms codominant trunks from near ground level and is multi trunked at 1.4 metres - while appearing sound at the time of inspection the junctions of the trunks are weak points in the tree's structure with increased risk of failure. Of low to moderate landscape significance
16	*Ceratonia siliqua* (Carob Tree)	A mature, twin trunked specimen approximately 9 metres high with a canopy spread of 7 x 10 metres and DBH of 280 and 360	Good health, good vigour	The tree displays signs of instability due to its location - the tree is growing in a narrow planter area approx 260mm wide between the driveway on the site and the building on the adjoining property which will have limited its root development on the west side. Of moderate landscape significance
17	*Celtis sinense* (Chinese Hackberry)	A semi mature, twin trunked specimen approximately 14 metres high with a canopy spread of 9 metres and DBH of 250, 330	Good health, good vigour	The tree displays signs of instability with codominant trunks from near ground level and evidence of poor attachment (deep bark inclusion at junction). Of moderate to high landscape significance.
18	*Glochidion ferdinandii* (Cheese Tree)	A mature, twin trunked specimen approximately 9 metres high with a canopy spread of 5 metres and DBH of approximately 220mm and 240mm.	Good health, good vigour	The tree forms codominant trunks from near ground level - while appearing sound at the time of inspection the junctions of the trunks is a weak point in the tree's structure with increased risk of failure - recommended the junction be monitored to check structural integrity at the project application stage. Ivy growing on lower trunk area - some recently removed from one trunk. The tree's canopy development has been significantly suppressed by tree number 19. Of low to moderate landscape significance. **Located on the adjoining property to the south.**
19	*Celtis sinense* (Chinese Hackberry)	A mature, single trunked specimen approximately 13 metres high with a canopy spread of 14 metres and a DBH of approximately 540mm.	Good health, good vigour	The tree forms codominant trunks at 3 metres - while appearing sound at the time of inspection the junctions of the trunks is a weak point in the tree's structure with increased risk of failure - recommended the junction be monitored to check structural integrity at the project application stage. Of high landscape significance. **Located on the adjoining property to the south.**

3. TREES REQUIRING REMOVAL TO FACILITATE THE PROPOSED DEVELOPMENT

To facilitate construction of the proposed development the following 8 trees will require removal and are marked on the Site Plan attached at Appendix D to be removed:

Table 2: Trees proposed to be removed to facilitate construction of the proposed development.

TREE NUMBER(S)	SCIENTIFIC AND COMMON NAME	COMMENTS
10	*Syzigium luehmannii* (Small-leaved Lilli Pilli)	Immediately adjacent to the proposed apartment building number 3 and marked on the plans to be removed.
11	*Lophostemon confertus* (Brushbox)	Located within the footprint of the proposed apartment building number 3 and will require removal.
12	*Celtis sinense* (Chinese Hackberry)	Located within the footprint of the proposed apartment building number 3 and will require removal. It should be noted this tree has been identified in section 5 (table 4) of the report as recommended for removal, regardless of the proposal.
13	*Celtis sinense* (Chinese Hackberry)	Located within the footprint of the proposed apartment building number 3 and will require removal. Marked on the plans to be removed.
14	*Jacaranda mimosifolia* (Jacaranda)	Immediately adjacent to the proposed apartment building number 3and marked on the plans to be removed.
15	*Plumeria rubra* (Frangipani)	Within proposed landscape area and adjacent to proposed apartment building number 3.
16	*Ceratonia siliqua* (Carob Tree)	Located within area proposed for basement parking and will require removal. It should be noted this tree has been identified in section 5 (table 4) of the report as recommended for removal, regardless of the proposal.
17	*Celtis sinense* (Chinese Hackberry)	Located with area proposed for basement parking and will require removal.

It should be noted that 2 of the 8 trees requiring removal have been identified as recommended for removal, regardless of the proposal in section 5 (table 4) of this report – these are tree numbers 12 and 16.

In addition to the above it is also proposed to remove the 2 rows of small, semi mature *Camellia sasanqua* (Chinese Camellia) identified as tree numbers 7 and 8. It is noted that these 2 rows of trees are exempt from protection under City of Sydney Council's Tree Preservation Order as they are below the minimum height for protection under that order of 5 metres. (City of Sydney 2004)

4. TREES POTENTIALLY IMPACTED BY THE PROPOSED DEVELOPMENT

During construction works trees that are proposed to be retained have the potential to be affected, directly or indirectly, by the works. To facilitate construction of the proposed development the following 3 trees or groups of trees will be potentially impacted by the works:

Table 3: Trees potentially impacted by the proposed development.

TREE NUMBER(S)	SCIENTIFIC AND COMMON NAME	COMMENTS
9	*Liriodendron tulipifera* (Tulip Tree)	The proposed apartment building number 3 is approximately 1.8 metres from the tree and is calculated to potentially impact on 52.7m ²or 34.25% of the tree's primary root zone. Works will also be within the tree's critical root zone and damage to structural roots and impacts on stability are likely to occur. The impact is considered to be high. The proposed basement carpark is located at the extremity of the tree's root zone on the northern side. Given the extent of impact and the tree's identified structural issues and short SULE it is recommended consideration be given to the tree's removal and replacement as part of the works.
18	*Glochidion ferdinandii* (Cheese Tree)	Located on the adjoining property to the south and adjacent to the site boundary. If the existing driveway levels can be retained in the root zones of this tree impacts can be minimised.
19	*Celtis sinense* (Chinese Hackberry)	Located on the adjoining property to the south and adjacent to the site boundary. If the existing driveway levels can be retained in the root zones of this tree impacts can be minimised.

5. TREES THAT SHOULD BE CONSIDERED FOR REMOVAL

Following assessment of the trees on the site it is considered the following 4 trees are of low to moderate landscape significance and should be considered for removal from the property due to poor/declining health, structural condition or unsuitability to the site:

Table 4: Trees recommended for consideration for removal.

TREE NUMBER(S)	SCIENTIFIC AND COMMON NAME	REASON
2	*Ligustrum sinense* (Small-leaved Privet)	The tree has been incorrectly pruned ('lopped') at 1.3 metres - the resulting regrowth is poorly attached with increased risk of failure. This species is an environmental weed - removal and replacement recommended. Noxious weed.
5	*Cinnamomum camphora* (Camphor laurel)	At the time of inspection the tree exhibited very high levels of dieback and deadwood and high levels of epicormic growth on the scaffold branches. The tree is in decline with a very short predicted SULE (< 5 years). There is increased risk of branch fall with large diameter deadwood present in the upper canopy. Removal and replacement with a suitable species is recommended.
12	*Celtis sinense* (Chinese Hackberry)	The tree displays signs of instability with an exposed root plate and limited root growth on the north side of the trunk due to its immediate proximity to the existing building on its north side - the risk of failure will increase as the tree's canopy increases in dimension.
16	*Ceratonia siliqua* (Carob Tree)	The tree displays signs of instability due to its location - the tree is growing in a narrow planter area approx 260mm wide between the driveway on the site and the building on the adjoining property which will have limited its root development on the west side.

In addition to the above trees it is recommended replacement planting be implemented to allow for the staged removal of all specimens of *Celtis sinense* (Chinese Hackberry) from the site due to this species weed status (tree numbers – while some of these specimens are visually of high landscape significance this species is an aggressive weed with many juvenile and semi mature species present on the site – the retention of these trees in the long term will provide an ongoing seed source for future spread of this species both within and beyond the site (via stormwater and bird dispersal).

In addition to the above trees there are a number of weeds species that are present in varying densities on the site that require management. These include the following species:
Ageratina adenophora (Crofton Weed), *Celtis sinensis* (Chinese Hackberry), *Bidens Pilosa* (Cobblers Pegs), *Parietaria judaica*, (Asthma weed) and *Tecoma stans* (Yellow Bells).

6. TREE PROTECTION MEASURES

The following protection measures are recommended to assist in minimising potential impacts (to trees to be retained) that may arise during the demolition and construction phases if the property is to undergo redevelopment (including the implementation of landscape works on the site).

A. Measures to be implemented prior to the commencement of any works on the site.

1. All trees identified for retention/protection are to be clearly identified by signage as protected trees.

2. The primary root zone areas of trees identified for protection are to be protected by fencing during the entire construction period except for specific areas directly required to achieve construction works.

3. The tree protection fence shall be constructed of galvanised pipe at 2.4 metre spacing and connected by securely attached chain mesh fencing to a minimum height of 1.8 metres prior to work commencing.

B. Measures to be implemented and maintained during the life of construction works on the site.

4. Construction works, development (including utilities) or soil level changes within the critical root zones of trees identified for protection shall be avoided or, if unavoidable, shall be restricted to pier and beam style or suspended slab construction (including driveway construction).

5. Any excavation (e.g. for piers/posts) within the primary root zones of trees identified for protection shall be carried out by hand to minimize disturbance to tree roots. Roots greater than 30mm are not to be damaged or severed without prior assessment by an arborist to determine likely level of impact and the restorative actions required to minimise the impacts of root damage.

6. Tree roots between 10mm and 30mm diameter, severed during excavation, shall be cut cleanly by hand and the tree subsequently treated with a root growth hormone and wetting agent, by an experienced Arborist/Horticulturist with a minimum qualification of the Horticulture Certificate or Tree Surgery Certificate.

7. To prevent soil compaction or contamination no storage or mixing of construction materials shall be allowed within the primary root zone area of trees identified for protection.

8. Canopy pruning of trees identified for protection which is necessary to accommodate approved building works shall be undertaken by an experienced Horticulturist/ Arborist, with a minimum qualification of the Horticulture Certificate or Tree Surgery Certificate and in accordance with Australian Standard 4373-1996 'Pruning of Amenity Trees':

C. Measures to be implemented following completion of all works on the site.

9. The primary root zone of trees identified for protection are to be mulched with 100mm of woodchip and monitored during the construction period and for 6 months following completion of works to ensure adequate soil moisture is available to assist in the trees' recovery.

7. CONCLUSION

Nineteen trees have been assessed in the course of preparing this report. Of these, fourteen (14) of the trees are in good health, four (4) are of moderate health and one (1) is in poor health. Two (2) of the trees assessed are located on the adjoining property to the south (tree numbers 18 and 19). In regard to landscape significance the majority of the trees are either of moderate landscape significance (6 trees) or of low landscape significance (4 trees). Six (6) of the trees are of moderate to high or high landscape significance and one is considered significant in the landscape. One of the trees is an environmental pest species of no landscape significance.

Of the 19 trees on the site that have been assessed the following eight (8) trees require removal to facilitate the proposed developments:

Tree # 10 *Syzigium luehmannii* (Small-leaved Lilli Pilli)
Tree # 11 *Lophostemon confertus* (Brushbox)
Tree # 12 *Celtis sinense* (Chinese Hackberry)
Tree # 13 *Celtis sinense* (Chinese Hackberry)
Tree # 14 *Jacaranda mimosifolia* (Jacaranda)
Tree # 15 *Plumeria rubra* (Frangipani)
Tree # 16 *Ceratonia siliqua* (Carob Tree)
Tree # 17 *Celtis sinense* (Chinese Hackberry)

Two of these trees (Nos. 12 and 16) have been recommended for removal along with a further 2 trees (2 and 5), regardless of the proposal, due to declining health or condition, structural issues relating to the trees or their unsuitability to the site.

In addition to the 4 trees recommended for removal it is recommended replacement planting be implemented to allow for the staged removal of all specimens of *Celtis sinense* (Chinese Hackberry) from the site due to this species weed status (while some of these specimens are visually of high landscape significance this species is an aggressive weed with many juvenile and semi mature specimens present on the site). The retention of these trees in the long term will otherwise provide an ongoing seed source for future spread of this species both within and beyond the site (via stormwater and bird dispersal).

In addition to the above it is also proposed to remove the 2 rows of small, semi mature *Camellia sasanqua* (Chinese Camellia) identified as tree numbers 7 and 8. It is noted that these 2 rows of trees are exempt from protection under City of Sydney Council's Tree Preservation Order as they are below the minimum height for protection under that order of 5 metres.

To facilitate construction of the proposed development the following 3 trees will be potentially affected:

Tree # 9 *Liriodendron tulipifera* (Tulip Tree)
Tree # 18 *Glochidion ferdinandii* (Cheese Tree)
Tree # 19 *Celtis sinense* (Chinese Hackberry)

The potential impacts are discussed in section 4 (table 3) of this report. The level of impact to tree number 9 is considered to be high and is likely to have an impact on its long term health. Given the extent of impact and the tree's identified structural issues and short SULE it is recommended consideration be given to the tree's removal and replacement as part of the works.

General tree protection measures are recommended in section 6 of this report to minimise potential impacts to the trees to be retained.

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17 May 2007

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APPENDIX A

Photograph 1: Tree # 1 – illustrating the multiple trunks from near ground level with evidence of poor attachment.

Photograph 2: Tree # 3 –.illustrating the termite leads/mudding in the lower trunk bark.

Photograph 3: Tree # 5 – Illustrating the very high levels of dieback in the upper canopy.

Photograph 4: Tree # 6 – illustrating the high levels of dieback and very high levels of epicormic growth.

Photograph 5: Tree # 14 – illustrating the crotch in the trunk junction at 1.4 metres on the north side with potential for decay.

Photograph 6: Tree # 16 – illustrating the limited planter area in which the tree is growing.