ARBORICULTURAL ASSESSMENT AND DEVELOPMENT IMPACT REPORT

FOR THE NORTH EVELEIGH SITE
WILSON STREET
DARLINGTON

Prepared by:
Guy Paroissien
Landscape Matrix Pty Ltd.
ABN 53 110 564 102
T/F. 9943 6510, M. 0425 342 051
40 Timbarra Road St Ives NSW 2075
E-mail: landscapematrix@optusnet.com.au

CONTENTS

EXECUTIVE SUMMARY

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 North Eveleigh site at Wilson Street, Darlington. The report is prepared to satisfy the Director-General's Requirements issued in accordance with Section 75F of the *Environmental Planning and Assessment Act 1979* for the Concept Plan for North Eveleigh.

The report identifies those trees that will require removal in the Concept Plan for the redevelopment of the site for a mix of uses including commercial buildings, residential apartments, community facilities 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.

The site has been developed and used for railway workshops for many decades in the past and the site has been cleared of its original vegetation for a long period of time. Some replanting of exotic and Australian plants has occurred over time in parts of the site. Many of the plantings are in declining health and very few of the trees within the site are of high landscape significance. A total 141 trees are located on the site, with an additional 82 trees located on Wilson Street, adjacent to the site.

The most significant vegetation on the site occurs at the eastern end in the vicinity of the Chief Mechanical Engineer's Office building. These significant trees will be retained.

Other notable vegetation is located at the western end of the site on the embankment bordering the Wilson Street boundary. Development in this location will require the removal of the vegetation. As a result additional trees are proposed to be planted on the Wilson St verge to maintain the green edge to the site.

This report recommends the removal of 48 trees which are regarded as weed species and are recommended to be removed regardless of the need for removal for development purposes. The removal of these from the site will minimise future spread of weeds both within and beyond the site.

A total of 80 trees are proposed to be removed for the purpose of the development. It is important to note that Turf Design has prepared a Landscape Concept Plan for the site which provides for significant planting on the site, more than replacing the trees to be removed and ensuring the retention of all existing green spaces and the creation of new green spaces on the site.

Of those trees to be removed only 4 have been identified as significant trees. This compares to 34 significant trees being retained. Additionally 33 of the trees to be removed are located on the southern boundary of the site and require removal due to RailCorp requirements. Three Canary Island Palms located at the rear of the Chief Mechanical Engineer's Office building are intended to be transplanted elsewhere on site.

Street tree plantings on Wilson St adjacent to the site form an important green edge to the site. Of the 82 street trees on Wilson Street adjacent to the site 41 have the potential to be impacted upon by redevelopment works at the site (e.g. excavation). The potential impact may be disturbance to root zones from excavation works on the site, although impact is unlikely to be significant in the majority of these trees and will be further reduced as a result of recent root disturbance due to the construction of a new pedestrian path.

A detailed assessment of potential impacts on specific trees will need to be undertaken when detailed development proposals are available. Specific trees protection measures will need to be considered at this time.

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 North Eveleigh site at Wilson Street, Darlington. The report is prepared to satisfy the Director-General's Requirements issued in accordance with Section 75F of the *Environmental Planning and Assessment Act 1979* for the Concept Plan for North Eveleigh.

The report identifies those trees that may require removal in the concept proposals for the redevelopment of the site for a mix of uses including commercial buildings, residential apartments, community facilities 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.

Due to the large number of trees assessed the site was inspected on 4 occasions to collect data for preparation of this report. Inspections were undertaken on 29 November 2007, 3 December 2007, 10 December 2007 and 3 January 2008 for the purpose of collecting data. Several other inspections were also undertaken to verify data and assist in preparing this report. 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 are 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

A total of 229 trees on or adjacent to the site 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 Plans prepared by Whelans Insites Pty Ltd, Consulting Surveyors, dated August 2007, Project Number C641SC and identified as Sheets 1, 2 and 3 (as updated by Landscape Matrix on 4 January 2008 to include tree numbers). A copy of the updated survey with tree numbers is included as Appendix C. Tree numbers 11 to 16, 127, 161, 162 and 222 to 226 have been added to the survey by Landscape Matrix and are approximate locations only (i.e. not to survey).

The site supports a range of planted Australian and exotic canopy species. The site has been developed and used for railway workshops for many decades in the past and the site has been cleared of its original vegetation for a long period of time. Some replanting of exotic and Australian plants has occurred over time in parts o the site. It is apparent many areas of the site have not been consistently maintained in recent years with weed species establishing and colonizing these areas. The most significant vegetation occurs in the following areas of the site:

- Planting in the vicinity of the Chief Mechanical Engineer's Office building in the eastern part of the site(tree #s 89 to 112 and tree #s 228 to 235); and
- Vegetation on the embankment adjacent to Wilson Street towards the western part of the site (tree #s 183 to 219).
- Street tree plantings on Wilson Street adjacent to the site (tree #s 1 to 81 and tree # 181);

The trees on the site and those on Wilson Street adjacent to the site that have been assessed for this report are summarised in table 1 as follows:

Table 1: Summary of all species assessed, number and height range.

SPECIES	COMMON NAME	NUMBER PRESENT	HEIGHT RANGE (metres)
Acacia parramattensis	Parramatta Wattle, Sydney Green Wattle	3	4 to 11
Allocasuarina torulosa	Forest Oak	1	7
Angophora costata	Smooth Barked Apple, Sydney Red Gum)	3	9 to 13
Callistemon viminalis	Weeping Bottlebrush	4	4.5 to 8
Casuarina cunninghamiana	River Oak	6	5.5 to 7
Casuarina glauca	Swamp Oak	1	16
Celtis occidentalis	Hackberry	2	11 to 12
Celtis sinensis	Chinese Hackberry	19	8 to 14
Cinnamomum camphora	Camphor Laurel	8	8 to 17
Corymbia citriodora	Lemon Scented Gum	1	14
Eucalyptus baueriana	Blue Box	1	12
Eucalyptus botryoides	Bangalay, Southern Mahogany	1	9
Eucalyptus leucoxylon	Yellow Gum	2	8 to 11
Eucalyptus microcorys	Tallowood	5	9 to 19
Eucalyptus nicholii ť	Narrow-leaved Black Peppermint	4	7 to 10
Eucalyptus punctata	Grey Gum	2	9 to 12
Eucalyptus robusta	Swamp Mahogany	1	10
Eucalyptus scoparia ť	Wallangara White Gum, Willow Gum	3	4 to 12
Eucalyptus sideroxylon	Mugga Ironbark	2	8 to 9
Eucalyptus sieberi	Silvertop Ash, Black Ash	1	8
Eucalyptus sp.	Gum Tree	6	7 to 15

Grevillea robusta	Silky Oak	2	12
Hakea salicifolia	Willow-leaved Hakea	6	7 to 8
Jacaranda mimosifolia	Jacaranda	3	5 to 8
Leptospermum petersonii	Lemon Scented Tea-tree	9	6 to 8
Lophostemon confertus	Brushbox	34	5 to 15
Malus sp.	Apple	1	5
Melaleuca armillaris	Bracelet Honey Myrtle	3	5 to 8
Melaleuca bracteata	Black Tea-tree, Snow in Summer	8	7 to 10
Melaleuca quinquenervia	Broad-leaved Paperbark	9	6.5 to 11
Melaleuca styphelioides	Prickly Paperbark	1	6
Melia azedarach	White Cedar	4	4 to 11
Morus alba	Mulberry Tree	1	7
Phoenix canariensis	Canary Island Date Palm	3	4.5 to 10
Pittosporum undulatum	Native Daphne, Sweet Pittosporum	24	4 to 11
Platanus x hybrida	London Plane Tree	26	7 to 18
Prunus sp.	Nectarine	1	6
Rainforest Species (Possibly a *Flindersia sp* - Ash)	Rainforest Species	1	5
Robinia pseudoacacia	False Acacia, Black Locust	11	5 to 11
Schinus molle	Pepper Tree	2	5.5 to 8
Tristaniopsis laurina	Water Gum, Kanuka	8	5 to 11
Ulmus parvifolia	Chinese Elm	1	8
X Cupressocyparis leylandii	Leyland Cypress	1	7
	Total	**235**	

t' Listed on the Schedules of Threatened Species Conservation Act 1995 and Environment Protection and Biodiversity Conservation Act 1999.

As noted above *Eucalyptus nicholii* (Narrow Leaved Peppermint Gum, Narrow Leaved Black Peppermint) and *Eucalyptus scoparia* (Wallangara White Gum, Willow Gum) are listed on the Schedules of the NSW Threatened Species Conservation Act 1995. *Eucalyptus scoparia* is listed as an endangered species under that Act and *Eucalyptus nicholii* is listed as vulnerable species under that Act. Both species are also listed as a nationally vulnerable species under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. (NPWS 2002).

However, Tree #s 6, 24, 28, 34, 46, 28 and 72 are considered to be planted specimens rather than remnant vegetation as neither species is recorded as occurring naturally at this locality. (NPWS 2002) Taking this into account it is considered that there will not be a significant impact on threatened species arising from the proposal and the relevant tests under Section 5A of the Environment Planning and Assessment Act 1979 are not required.

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

3. SITE PRECINCTS FOR TREE SUMMARIES

Due to the large number of trees on the site the summaries of trees present on the site have been separated into three broad zones, East, West and on Wilson St adjacent to the site as follows:

Table 2: Site Precincts for Tree Summaries

PRECINCTS	EAST PRECINCT	WEST PRECINCT	STREET TREES ON WILSON STREET ADJACENT TO THE SITE
TREE NUMBERS	Tree numbers 17A, 82 to 128, 228 to 235	Tree numbers 129 to 167, 175, to 180, 182 to 227	Tree numbers 1 to 81, 181
TOTAL NUMBER OF TREES/PRECINCT	**56 trees**	**91 trees**	**82 trees**

It is noted that tree numbers 168 to 174 to the south west of the site are not within the site boundaries or within close proximity to the proposed development and are not considered in this report.

The following 3 sections of the report (sections 4, 5 and 6) provide summaries, in table format, of the trees at the site.

4. EASTERN PRECINCT TREES

There are a total of 56 trees in the eastern precinct. The trees in this precinct are summarised in table 3.

Table 3: Eastern Precinct - Summary of species assessed, number and height range.

SPECIES	COMMON NAME	NUMBER PRESENT	HEIGHT RANGE (metres)
Acacia parramattensis	Parramatta Wattle, Sydney Green Wattle	1	4
Callistemon viminalis	Weeping Bottlebrush	1	8
Celtis occidentalis	Hackberry	2	11 to 12
Celtis sinensis	Chinese Hackberry	17	8 to 14
Cinnamomum camphora	Camphor Laurel	3	10 to 17
Eucalyptus leucoxylon	Yellow Gum	1	11
Eucalyptus microcorys	Tallowood	2	16 to 19
Eucalyptus sp.	Gum Tree	2	7 to 11
Grevillea robusta	Silky Oak	2	12
Malus sp.	Apple	1	5

Melaleuca bracteata	Black Tea-tree, Snow in Summer	8	7 to 10
Melia azedarach	White Cedar	1	11
Phoenix canariensis	Canary Island Date Palm	3	4.5 to 10
Platanus x hybrida	London Plane Tree	11	7 to 17
X Cupressocyparis leylandii	Leyland Cypress	1	7
	Total	**56**	**4.5 to 19**

31 of the trees in the eastern precinct will be removed as identified in table 6.

5. WESTERN PRECINCT TREES

There are a total of 91 trees in the western precinct. The trees in this precinct are summarised in table 4.

Table 4: Western Precinct - Summary of species assessed, number and height range.

SPECIES	COMMON NAME	NUMBER PRESENT	HEIGHT RANGE (metres)
Acacia parramattensis	Parramatta Wattle, Sydney Green Wattle	2	7 to 11
Angophora costata	Smooth Barked Apple, Sydney Red Gum	3	9 to 13
Callistemon viminalis	Weeping Bottlebrush	3	4.5 to 7
Celtis sinensis	Chinese Hackberry	3	11
Cinnamomum camphora	Camphor Laurel	5	8 to 14
Hakea salicifolia	Willow-leaved Hakea	6	7 to 8
Leptospermum petersonii	Lemon Scented Tea-tree	8	6 to 8
Lophostemon confertus	Brushbox	20	5 to 15
Melaleuca armillaris	Bracelet Honey Myrtle	2	5 to 8
Melaleuca quinquenervia	Broad-leaved Paperbark	8	7 to 11
Morus alba	Mulberry Tree	1	7
Pittosporum undulatum	Native Daphne, Sweet Pittosporum	18	4 to 10
Platanus x hybrida	London Plane Tree	2	13
Robinia pseudoacacia	False Acacia, Black Locust	10	5 to 11
	Total	**91**	**4.5 to 15**

As identified in table 6 all 91 trees in the western precinct will be removed.

6. STREET TREES ON WILSON STREET FRONTAGE OF THE SITE

There are a total of 82 trees located on the Wilson Street frontage of the site. The trees in this precinct are summarised in table 5.

Table 5: Street trees in Wilson Street - Summary of species assessed, number and height range.

SPECIES	COMMON NAME	NUMBER PRESENT	HEIGHT RANGE (metres)
Allocasuarina torulosa	Forest Oak	1	7
Casuarina cunninghamiana	River Oak	7	5.5 to 16
Corymbia citriodora	Lemon Scented Gum	1	14
Eucalyptus baueriana	Blue Box	1	12
Eucalyptus botryoides	Bangalay, Southern Mahogany	1	9
Eucalyptus leucoxylon	Yellow Gum	1	8
Eucalyptus microcorys	Tallowood	3	9 to 12
Eucalyptus nicholii	Narrow-leaved Black Peppermint	4	7 to 10
Eucalyptus punctata	*Grey Gum*	2	9 to 12
Eucalyptus robusta	Swamp Mahogany	1	10
Eucalyptus scoparia	*Wallangara White Gum, Willow Gum*	3	4 to 12
Eucalyptus sideroxylon	Mugga Ironbark	2	8 to 9
Eucalyptus sieberi	Silvertop Ash, Black Ash	1	8
Eucalyptus sp.	*Gum Tree*	4	8 to 15
Jacaranda mimosifolia	Jacaranda	3	5 to 8
Leptospermum petersonii	Lemon Scented Tea-tree	1	6
Lophostemon confertus	Brushbox	14	7 to 15
Melaleuca armillaris	Bracelet Honey Myrtle	1	7
Melaleuca quinquenervia	Broad-leaved Paperbark	1	6.5
Melaleuca styphelioides	Prickly Paperbark	1	6
Melia azedarach	White Cedar	3	4 to 5
Platanus x hybrida	London Plane Tree	13	9 to 18
Rainforest Species (Possibly a *Flindersia sp* - Ash)	Rainforest Species (Possibly a *Flindersia sp* - Ash	1	5
Robinia pseudoacacia	False Acacia, Black Locust	1	9
Schinus molle	Pepper Tree	2	5.5 to 8
Tristaniopsis laurina	Water Gum, Kanuka	8	5 to 11
Ulmus parvifolia	Chinese Elm	1	8
	Total	**82**	**4 to 18**

7. TREES PROPOSED TO BE REMOVED AS PART OF DEVELOPMENT OF THE SITE

It is likely the majority of trees within the site's boundaries will require removal to facilitate redevelopment of the site with the exception of trees within the vicinity of the recently constructed apartments and the Chief Engineer's building as this building and its immediate surround/curtilage is proposed to be retained.

Trees that are likely to be removed can be summarised as follows:

Table 6: Trees within the site proposed to be removed

Zone/Precinct	**Trees likely to be removed**	**Number of trees proposed to be removed**
East Zone	Tree #s 17A, 82 to 89, 96, 97, 100 to 107, 110, 112 to 128	37
West Zone	Tree #s 129 to 167, 175 to 180, 182 to 227	91
	Total trees proposed to be removed	**128**

As identified in table 9 a total of 128 trees within the site are proposed to be removed to facilitate redevelopment of the site.

It is noted that of the 128 trees within the site that are likely to require removal 48 of these trees have been identified as weed species and are recommended for removal, regardless of any development proposals, in section 9 (table 8) of this report. These trees are tree #s 82, 83, 87, 88, 100, 101, 102, 103, 104, 105, 106, 107, 110, 112, 114, 115, 116, 117, 128, 129, 137, 138, 149, 150, 154, 155, 156, 157, 158, 159, 160, 161, 164, 175, 176, 177, 178, 179, 182, 204, 205, 206, 207, 208, 209, 217, 225 and 227.

8. 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.

8.1 Street Trees in Wilson Street potentially affected

Of the 82 street trees on the Wilson Street frontage of the site 41of these trees have the potential to be impacted upon by redevelopment works at the site (e.g. excavation). However, a concrete pathway approximately 1.8 metres wide has recently been constructed between the trees and the site boundary. Works for the pathway (excavation) have resulted in disturbance to the root zones of most of the street trees in Wilson Street. This disturbance to the trees' root zones will, in the case of many of the trees, reduce the disturbance at the boundary when the site is redeveloped.

Trees potentially affected are identified in Table 7.

Table 7: Street Trees on Wilson Street potentially impacted by the proposed development

Zone/Precinct Frontage	Trees potentially affected	Number of trees potentially affected
East Precinct frontage	Tree #s 17 to 41	25
West Precinct frontage	Tree #s 67 to 81, 181	16
	Total street trees potentially impacted	**41**

A potential impact of construction will be disturbance to root zones from excavation works on the site.

A number of methods to determine the likely extent of root zones and appropriate setbacks for tree root protection zones for trees on development sites have been developed in the past. The key criteria used in determining setbacks is the tree's trunk diameter at breast height (DBH) in conjunction with other factors including the sensitivity of the species in question to environmental disturbance/change, the age of the tree and the tree's health and vigour at the time.

Harris et al (2004) provide formulae for calculating tree protection zones based on the above criteria and modified from the 1991 British Standard for protection of trees on construction sites (BS 5837:1991). The 2005 version of the British Standard (BS 5837:2005) recommends a radius of 12 times the tree's DBH. In addition to the above methods a setback based on 10 times the DBH to identify the primary root zone and 5 times the DBH to identify the critical root zone is widely accepted and used by many consulting arborists.

The primary root zone is the optimum setback from the tree where disturbance (e.g. soil level changes, compaction, excavation etc) should be minimised to limit potential impacts on the long term health of the tree. The critical root zone is the area where disturbance of any sort should be avoided if possible.

The majority of the tree #s 67 to 81 are located 2.8 to 3.1 metres from the site boundary and the majority of the tree #s 17 to 41 are located 2.5 to 2.8 metres from the site boundary. Based on their DBH the root zones of the trees on Wilson Street potentially impacted by the proposed redevelopment of the site range from 2 to 7 metres radius from the trees and their critical root zones range up to 4 metres. Those trees with the larger root zones will be potentially impacted by excavation at the boundary of the site. However, as previously discussed the construction of the concrete pathway has recently disturbed the root zone of these trees.

It is recommended a detailed assessment of potential impacts on specific trees be undertaken when detailed development proposals are being developed and/or considered.

8.2 Trees within the site to be retained and potentially affected

Tree numbers 90 and 91 will be adjacent to the proposed access to the site from the eastern end of Wilson Street and will be impacted by disturbance to the soil; profile within their root zones. As with the potentially affected trees in Wilson Street it is recommended a detailed assessment of potential impacts on these 2 trees be undertaken when detailed development proposals are available. Once these details are available a detailed assessment of the actual level of disturbance and potential impacts can be undertaken.

Tree numbers 108, 109 and 111 are specimens of *Phoenix canariensis* (Canary Island Date Palms) located in the eastern precinct of the site in the vicinity of the former Chief Mechanical Engineers Office building. These palms are proposed to be transplanted and retained within the site as part of the site proposal. Due to the limited nature of their root systems these palms can be transplanted successfully within the site if required.

9. TREES THAT SHOULD BE CONSIDERED FOR REMOVAL REGARDLESS OF ANY DEVELOPMENT PROPOSALS

Following assessment of the trees on the site it is considered the following 68 trees should be considered for removal from the site, regardless of any development proposals, due to poor/declining health, structural condition or unsuitability to the site:

Table 8: Trees recommended for consideration for removal.

TREE NUMBER(S)	SCIENTIFIC AND COMMON NAME
117, 217	*Acacia parramattensis* (Parramatta Wattle, Sydney Green Wattle)
88, 93	*Celtis occidentalis* (Hackberry)
94-97, 100-104, 106-107, 114-116, 177-179	*Celtis sinensis* (Chinese Hackberry)
105, 110, 112, 175, 182, 204, 225, 227	*Cinnamomum camphora* (Camphor Laurel)
43	*Corymbia citriodora* (Lemon Scented Gum)
49	*Eucalyptus botryoides* (Bangalay, Southern Mahogany)
28, 48	*Eucalyptus scoparia (Wallangara White Gum, Willow Gum)*
128	*Eucalyptus sp.* (Gum Tree)
138	*Hakea salicifolia* (Willow-leaved Hakea)
60	*Jacaranda mimosifolia* (Jacaranda)
58	*Leptospermum petersonii* (Lemon Scented Tea-tree)
80, 206-209	*Lophostemon confertus* (Brushbox)
129	*Melaleuca armillaris* (Bracelet Honey Myrtle)
164	*Melaleuca quinquenervia* (Broad-leaved Paperbark)
40	*Melia azedarach* (White Cedar)
172, 205	*Pittosporum undulatum* (Native Daphne, Sweet Pittosporum)
75, 137	*Platanus x hybrida* (London Plane Tree)
50	Rainforest Species (Possibly a *Flindersia sp* - Ash)
51, 149, 150, 154-161	*Robinia pseudoacacia* (False Acacia, Black Locust)
25, 44-45	*Tristaniopsis laurina* (Water Gum, Kanuka)
87	*X Cupressocyparis leylandii* (Leyland Cypress)

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:

Celtis sinensis (Chinese Hackberry), *Cinnamomum camphora* (Camphor laurel), *Ligustrum lucidum* (Large-leaved Privet), *Ligustrum sinense* (Small-leaved Privet), *Cortaderia selloana* (Pampas Grass), *Tradescantia fluminensis* (Trad, Wandering Jew), *Protasparagus aethiopicus* (Asparagus Fen), *Solanum nigrum* (Blackberry Nightshade), *Lantana camara* (Lantana), *Verbena bonariensis* (Purple Top), *Plantago lanceolata* (Common Plantain) *Bidens Pilosa* (Cobblers Pegs), *Parietaria judaica*, (Asthma weed) and *Ageratina adenophora* (Crofton Weed).

10. TREE PROTECTION MEASURES

It is recommended a detailed assessment of potential impacts on significant trees be undertaken when detailed development proposals are being developed and/or considered.

When trees may be affected the following protection measures must be considered 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 4373-2007 '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.

11. USE OF TREES BY WILDLIFE

During the site inspections on 29 November 2007, 3 December 2007, 10 December 2007 and 3 January 2008 the trees on the site were checked for signs of use by wildlife.

A small number of the trees exhibited signs of usage by wildlife such as scratch marks or scats under tree canopies that were most likely made by a Common Brushtail Possum (*Trichosurus vulpecula*) or Common Ringtail Possum (*Pseudocheirus peregrinus*). A specimen of domestic cat (*Felis catus*) was observed on the site.

It is probable that a number of the trees would be used by native fauna at various times for food, shelter and roosting purposes and the retention and/or replacement of trees on the site will retain this opportunity.

The following bird species was noted on site during the data collection inspections on 29 November 2007, 3 December 2007, 10 December 2007 and 3 January 2008: Noisy Miner (*Manorina melanocephala*), Rainbow Lorikeet (*Trichoglossus haematodus*), White Ibis (*Threskiornis molucca*), Willie Wag Tail (*Rhipidura leucophrys*), Australian Raven (*Corvus coronoides*), Pee Wee, Magpie Lark (*Grallina cyanoleuca*), Common Koel (*Eudynamys scolopacea*), Little Wattlebird (*Anthochaera chrysoptera*), Australian Magpie (*Gymnorhina tibicen*) and the introduced species Feral Pigeon (*Columba livia*) and Indian Mynah (*Acridotheres tristis*).

None of the above species are identified as vulnerable, endangered or threatened species and it is considered unlikely that the trees on the site would be used by threatened species on a regular basis for food, shelter and roosting purposes.

12. CONCLUSION

The site has been developed and used for railway workshops for many decades in the past and the site has been cleared of its original vegetation for a long period of time. Some replanting of exotic and Australian plants has occurred over time in parts of the site. Many of the plantings are in declining health and very few of the trees within the site are of high landscape significance.

It is apparent many areas of the site have not been consistently maintained in recent years with weed species establishing and colonizing these areas. In particular, many juvenile and semi mature specimens of Chinese Hackberry (*Celtis sinense*), False Acacia (*Robinia pseudoacacia*), Large and Small-leaved Privet (*Ligustrum lucidum*, *Ligustrum sinense*) and Camphor Laurel (*Cinnamomum camphora*) are present on the site. The removal of these (and other weeds) from the site will minimise future spread of weeds both within and beyond the site.

229 trees on or adjacent to the site have been assessed in preparing this report. The most common species occurring on the site and adjoining Wilson Street frontage are:

Lophostemon confertus (Brushbox) – 34 specimens,
Platanus x hybrida (London Plane Tree) – 26 specimens,
Pittosporum undulatum (*Native* Daphne, Sweet Pittosporum) – 24 Specimens, and
Celtis sinensis (Chinese Hackberry) – 19 specimens.

The most significant vegetation on the site occurs at the eastern end in the vicinity of the Chief Mechanical Engineer's Office building. These significant trees will be retained.

Other notable vegetation is located at the western end of the site on the embankment bordering the Wilson Street boundary. Development in this location will require the removal of the vegetation. As a result additional trees are proposed to be planted on the Wilson St verge to maintain the green edge to the site.

A total of 38 trees have been identified as being of high landscape significance, medium to long safe useful life and therefore as priorities for retention if possible.

In total, 128 trees are proposed to be removed of which 48 are regarded as weed species and are recommended to be removed regardless of the development proposal. The removal of these weeds from the site will minimise future spread of weeds both within and beyond the site.

Street tree plantings on Wilson St adjacent to the site form an important green edge to the site. Of the 82 street trees on Wilson Street adjacent to the site 41 have the potential to be impacted upon by redevelopment works at the site (e.g. excavation). The potential impact may be disturbance to root zones from excavation works on the site, although impact is unlikely to be significant in the majority of these trees and will be further reduced as a result of recent root disturbance due to the construction of a new pedestrian path.

The remaining 41 trees on the Wilson Street frontage are unlikely to be affected to any material degree due to the retention and/or restoration of existing buildings on the site in the vicinity of these trees. The most likely impact will be disturbance to root zones from excavation works on the site.

A total of 80 trees are proposed to be removed for the purpose of the development. It is important to note that Turf Design has prepared a Landscape Concept Plan for the site which provides for significant planting on the site, more than replacing the trees to be removed and ensuring the retention of all existing green spaces and the creation of new green spaces on the site.

Of those trees to be removed only 4 have been identified as significant trees. This compares to 34 significant trees being retained. Of the trees proposed to be removed, 33 are located on the southern boundary of the site and require removal due to Rail Corp requirements. Three Canary Island Palms located at the rear of the Chief Engineer's Office building are intended to be transplanted elsewhere on site.

A detailed assessment of potential impacts on specific trees will need to be undertaken when detailed development proposals are available. Specific trees protection measures will need to be considered at this time.

General tree protection measures are identified in section 10 of this report to provide sample measures that could be used to minimise potential impacts to the trees to be retained.

Guy Paroissien, MAIH, MIACA
M Env. Mgt & Restor., Hort Cert., Tree Care Cert.
Director
Landscape Matrix Pty Ltd
18 March 2008

BIBLIOGRAPHY/REFERENCES

Barrell J (1996) - Pre-planning Tree Surveys: SULE is the Natural Progression. Arboricultural Journal 17, 33-46.

British Standards Institute (2005) – BS 5837:2005 Trees in relation to construction-Recommendations. Published by the British Standards Institute, London, United Kingdom.

Harris et al (2004). Harris RW, Clark JR, Matheny NP: Arboriculture – Integrated Management of Landscape Trees Shrubs and Vines 4TH Edition. Prentice Hall, New Jersey 07458.

Mattheck & Breloer (1994) – The Body Language of Trees – a handbook for failure analysis - Research for Amenity Trees No. 4. Published by TSO (The Stationary Office) Norwich UK.

NPWS (2002) – Final determination of the NSW Scientific Committee to list *Eucalyptus scoparia* as a threatened species under the NSW Threatened Species Conservation Act 1999. Availabale at: http://nationalparks.nsw.gov.au/npws.nsf/Content/Eucalyptus+scoparia+a+tree+endangered+species+listing

NPWS (2002) – Final determination of the NSW Scientific Committee to list *Eucalyptus nicholii* as a threatened species under the NSW Threatened Species Conservation Act 1999. Availabale at: http://www.nationalparks.nsw.gov.au/npws.nsf/content/eucalyptus+nicholii+vulnerable+species+listing

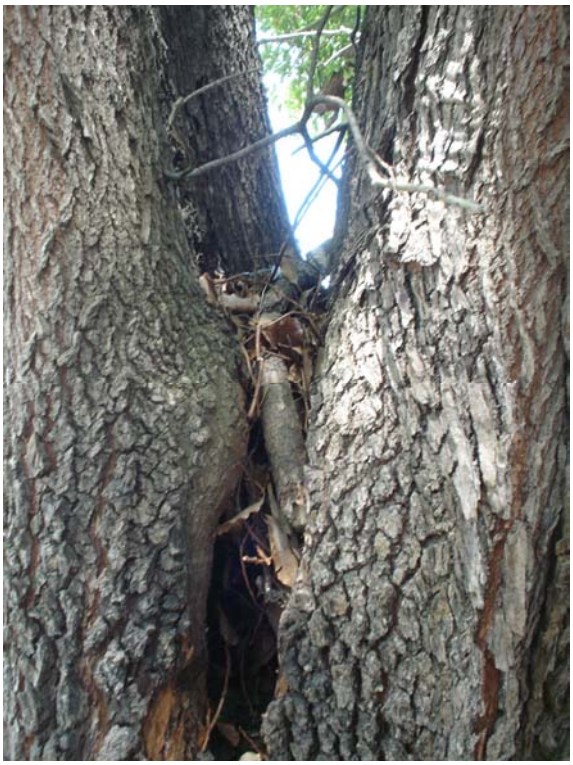
Pizzey G and Knight F 1997. Field Guide to the Birds of Australia. Updated and reprinted 2001 edition. Published by Angus and Robertson, Harper Collins Publishing, Pymble NSW Australia.

UBD Sydney Street Directory. 35th Edition. Published by UBD Australia.

APPENDIX A

Photograph 1: Illustrating the conflicts between trees and infrastructure in a number of trees on the Wilson Street frontage of the site.

Photograph 2: Illustrating the severe pruning (removal of central leaders) of many trees plated under electricity wires on the Wilson Street frontage of the site.



Photograph 3: Tree # 112 – Illustrating the failure and hollow at the junction of codominant trunks at 1.2 metres.

Photograph 4: Illustrating the severe past pruning (pollarding) and subsequent poorly attached regrowth in tree numbers 228 to 235.

Photograph 5: Illustrating the vegetation on the embankment adjacent to the Wilson Street boundary towards the western end on the site.

Photograph 6: Illustrating street trees in Wilson Street adjacent to the eastern end of the site.